T. Waldburg

THE SOUTHERN AGRICULTURIST, HORTICULTURIST,

AND

REGISTER OF RURAL AFFAIRS.

ADAPTED TO THE

Southern Section of the United States.

NEW SERIES.

VOL. 2—NO. II.

FEBRUARY, 1842.

EDITED BY J. D. LEGARE.

MONTHLY.

CHARLESTON, S. C.
PUBLISHED BY A. E. MILLER,
25 BROAD-STREET.

Five Dollars a Year,
IN ADVANCE.

CONTENTS.

AGRICULTURE.

PAGE.

Report of the Committee on Sea-island Cotton. By Whitemarsh B. Seabrook, Esq., Chairman,.....57

Report of the Committee appointed by the Agricultural Society of Cambridge, S. C., on Corn,.....67

Lectures on Agriculture, by Charles Daubeny, M. D., F. R. S., M. R. I. A., &c., Sibthorpian Professor of Rural Economy in the University of Oxford.....71

On Ploughing in Green Crops for Manure, from the Third Report of the Agriculture of Massachusetts,.....76

Preparation of Seed Corn,.....81

Weaning Lambs on Grass,.....81

Breaking Steers,.....83

Crows,.....84

Treatment of the Horse,.....85

A Holdback for Oxen.....89

HORTICULTURE.

On the General Management of Forcing Frames and Forwarding Early Vegetables. By Edward Sayers,.....90

FLORICULTURE.—Culture of the Carnation.....98

THE ORCHARD.—Of Pruning.....102

MISCELLANEOUS.

Obtaining Cream from Milk; Time of taking up Bees; Soaking Corn to feed Horses; Choking.—Important to Farmers; Weeding; How to keep a village Cow; Rats; To correct damaged Grain; Cabbage Worms; Effects of Salt on Poultry; Startling Fact; Bots in Horses; Discoveries in Hindostan; Antidote for Poison,
107, 108, 109, 110, 111, 112

GARDENER'S CALENDAR FOR FEBRUARY.....112

ERRATA.

Page 65, line 25 from top, for "labor" read *labors*.
" " " 30 " " for "distinguished" read *distinguishable*.
" 66 " 15 " " omit "and" after *gin*.
" " " 6 from foot omit "of" after *and*.

THE SOUTHERN AGRICULTURIST.

(NEW SERIES.)

Vol. II. FOR FEBRUARY, 1842. No. 2.

For the Southern Agriculturist.

REPORT OF THE COMMITTEE ON SEA-ISLAND COTTON.

[CONCLUDED FROM PAGE 17.]

No portion of the State is so abundantly supplied with materials for enriching the land as the Sea-Islands. On many of them there is scarcely a plantation of which one or more creeks do not form parts of its boundary. The quantity of salt grass, and of mud is therefore inexhaustible. If these were skilfully used, the complaint of failure in the crop, from sterility of the soil, would seldom be heard. Of the former, marsh is not only in every respect superior to the rush, (one of the varieties of the plant of the genus juncus,) but stands pre-eminent as a manure for Cotton among vegetable substances. To realize its full value, it should be incorporated with the earth during the summer months—the earlier the better. After the working of the crop has been completed, a certain number of active men are set to work with suitable flats or boats. The cuttings of each day are taken to the field on the following day and immediately buried; or rather, a little earth from the tops of the ridges are thrown upon the marsh, which, as the chops with the hoe are not made continuously along the entire line of the ridge, but intervals of six or eight inches of sward are left, is by this process only partially covered. The quantity for an acre is twenty piled cart-loads. If the land be very light, only sixteen loads are recommended, as the blue disease, where it is not sparingly used on such grounds, is likely to be generated, of an irregular season. Of course on all soils favorable to the production of blue Cotton, the application of marsh should be carefully avoided. By the rotting of this grass from exposure to the rains and heat of summer, according to the mode of piling it for future use so generally resorted to, one-third of its nutritious properties is lost by evaporation, and consequently, one-third of the labor and time expended in collecting it—a point

which appears to be wholly disregarded by the planter, is uselessly expended. If twenty cart-loads, the amount in general necessary for one acre, be accurately ascertained but not then listed in, when the usual period for removing them arrives, it will be found, that about twelve loads constitute the entire bulk; further, that the growth of the crop will show, that the manure is comparatively of an inferior quality. The task in gathering marsh for each laborer per day is three piled cart-loads. With these data, let us compare the actual results of the two practices, of which winter listings is almost universal. Ten fellows in thirty days will cut nine hundred loads, which, if buried in summer, will cover forty five acres of ground. On the other hand, if the operation be postponed until February, the quantity will be reduced to about six hundred loads, or enough only for thirty acres: the gain therefore by the method recommended is equal to the labor of ten men for ten days. Added to this there are incidental advantages worthy of especial notice. At no period is less work done by negroes than during the season for gathering manures. All expedients hitherto adopted to secure a full day's labor have been easily defeated. This plan surmounts the difficulty, as far as responsibility and mutual checks can accomplish it. Every day three sets of workers are separately engaged in effecting a particular purpose—the burying of a certain amount of marsh in a given quantity of land. The listers look to the carters, and the latter to the cutters. By these means, unless the head cartman, who should be selected for his faithfulness, neglects his duty, one and a half acres daily are well manured. Supposing four carts to be steadily engaged in taking away the marsh, and four ordinary females in listing it, the expense of fertilizing the six tasks, or one and a half acres, will be the labor of eighteen hands, of whom three may be small boys, and four mules per day.

The objections to summer listings are, first, that they expose the ground to the action of the sun when its surface should be protected by shade; secondly, that they injure the pasturage; and thirdly, that on very light soils and low lands, where marsh is applied, certain diseases known by the appellations of "blue" and "flaggy" are liable to be produced. In reference to the first objection, it may be remarked, that the tops of the old beds, from the want of

moisture, are usually bare. If the mode of taking from those parts of them only a small stock of earth in the manner already explained, be rigidly adhered to, the injury from this source, if any, so decidedly manifest is the benefit of the general practice, is too inconsiderable to be noticed. But it is denied that any pernicious consequences whatever ensue. If there exist for a brief season a partial denudation of a very small portion of the soil, the deposition of a large body of rich vegetable matter under its surface, will soon start into existence, if the season be moist, a crop of grass, where the sheep at some period of the day may always be found. The pasture grounds are consequently improved, at least under the influence of marsh, where the proper precautions are regarded.

Whilst it is believed, that no adverse or irregular season has ever been known to produce blue Cotton on lands assisted by rotted marsh listed in the winter, if this grass, where an undue quantity is used, be allowed to decompose under the sward by being buried in summer, that disease, in certain locations and under particular circumstances, educed by the weather, will occasionally show itself. The manure in the former state, having parted with most of its exciting properties, is at no time capable of exerting much power; but in reference to the latter, the excess of stimulus from a rapid fermentation during the season of the greatest heat and moisture, increased in proportion to the porosity and friability of the soil, deranges the functions of the plants, and ultimately perhaps destroys their procreative powers. This is the true reason why the lighter the land the greater the probability of danger from the application of marsh in summer. The remedy is obvious. On such soils use this substance more frugally, or with salt-mud, the great antidote to the "blue" poison. In addition to these suggestions, as alike applicable to low grounds, a resort to the spade is an essential auxiliary in preserving the health and arresting the flaggy disposition of the Cotton plant.

All that has been advanced on the subject of putting marsh under the ground in summer, apply with greater force to the rush-grass. Its decomposition is slow, and as it contains less aliment than its co-assistant, from seven to eight cart-loads to the task are required. It is a very safe manure, and well suited to any soil. Pine straw is of little value except when well trampled by the cattle. In its

crude state it should be put only on the highest and driest lands, as it ministers to the growing crop mainly by collecting and retaining moisture. In aid of this purpose, and to destroy the vermin of which pine-straw is the fruitful parent, the use of salt, at the rate of from one pint to a quart to the task row, will be found eminently beneficial.

Of salt-clay-mud it is not our design to speak at large. Although the best quality—that which has the largest proportion of marsh-roots, contains all the necessary ingredients of the most perfect soil, yet it is true that it gives but an inconsiderable growth to Cotton. May not this arise from some circumstance connected with its application to the land? The usual practice is to gather it between hoeing and harvest for future removal, or, if then taken to the field, to allow it to lie there until January or February. In the latter event, the heaps themselves soon exhibit the highest evidence of having incurred a considerable loss, but for this, compensation is erroneously supposed to be made by the facility with which the parts are separated, caused by the exposure of the mud to atmospheric action. When thrown up in winter, it is immediately put in the ground. All its virtues are thereby retained; nevertheless, if the lumps be not thoroughly broken, a large quantity of mud will yield but a small quantity of manure. *Ten cart-loads well pulverized are of more benefit, than fifteen loads carelessly chopped.* If the mud as soon as collected in summer be taken at once to the field, and there undergo the admitted tedious process of disintegration with the hoe, the chief benefits of the two plans might in a great degree be experienced. The labor of carting and of chopping, if at all, would only be slightly increased, as by this practice a much less quantity is necessary. In any field, which two years before had been in Cotton, the lumps of mud will be found in the same state in which they had been put in the ground. The vegetable matter therefore which composed them, it is evident, did not exercise its full power, though to effect that was the design of the planter. How then was the crop assisted? Only by the saline and alkaline properties of the mud, and the small stock of nutriment given merely by the surface of the lumps. If to these benefits, the clay, an essential part of this substance, be made to mix with the soil, which can only be done by pulverization, and the marsh-roots, that ought to constitute one-half of every hoe-

ful, be detached from the mass and cut into particles in order to facilitate their solubility, then, it may be said, that, as a manure for Cotton, salt-clay-mud, in a series of years, will realize a greater profit than any other known substance. The neglect of these apparently trifling matters, is probably the reason, why this manure does not materially add to the growth of Cotton. As it is of a cold nature, it is never advisable, except where the strength and natural warmth of the land will justify it, to use it alone. In connexion with Cotton seed, at the rate of only two and a half bushels to the task, or of well rotted compost manure, one piled basket to the row, its benefit is perhaps duplicated.

Of the value of lime we are practically ignorant. If the labors of one mind on this subject have been instrumental in effecting a revolution in the Agriculture of Virginia, the matter is surely worthy of an attentive consideration on the part of the planters of this state. "To bring into notice your calcareous manures, and induce your planters to use them," says Mr. Ruffin, in a letter to a citizen of Edisto Island, "would be worth more to South-Carolina than doubling the present products and pecuniary value of all that region." Sir H. Davy in his Agricultural Chemistry remarks, that "the earths, and even the earthy carbonates, have a certain degree of chemical attraction for many of the principles of animal and vegetable substances." That the carbonate of lime has this power in a degree far higher than the other earths and earthy carbonates, is a satisfactory reason why soils, destitute of lime in any state of combination, cannot be improved *durably or profitably* by putrescent manures without previously making them calcareous.* Of the ten specimens of soils of Edisto Island, subjected to analysis by Professor Shepard, there was but one that had even a trace of the carbonate of lime. We have, therefore, the evidence of the practical farmer and the man of science, that, so far as the Sea-islands are concerned, no permanent improvement of the land is to be expected until lime in some form is used. In elucidation of this position, it should not be forgotten, that our soils are sandy—that by freely admitting air and moisture, the chief agents of fermentation, the decomposition of vegetable matter is easily effected—and that of putrescent substances, the most soluble are the

* Ruffin on Calcareous Manures.

most readily destroyed. All the manures therefore upon which we rely are of a fleeting character—they exist only for a season. No means are used by the planter to prevent the escape of the gases from the compost heap, or to collect from the atmosphere, the matrix of manures in the opinion of many eminent Agriculturists, the treasures in which it abounds. The chemical energy of the carbonate of lime is alone competent to attain these desirable ends. It attracts and retains the elementary principles which are the appropriate food for plants. So true is this, that to new lands in Virginia calcareous manure is added, solely that it might combine with and fix the vegetable manure in the soil. By the application of lime the poisonous acid of grounds is immediately neutralized, permanency of fertility is obtained, and, as it deals out nutriment slowly, but regularly, excess of fermentation, the prominent cause of new-growth in Cotton, can at no time take place; hence, one of the greatest causes of failure in that crop will be removed. No decided benefit, it is said, is experienced from lime the first year. The quantity for an acre, to be repeated in ten or twelve years, is from fifty to two hundred bushels.

Of manures limited in quantity, that contain a large stock of fertilizing matter in a small compass, ashes, cotton seed, and corn stalks, are entitled to particular notice. A bushel of ashes, on the authority of Dr. Dana, is equal to a cask of lime. Where proper means are used, the amount of ashes that can be collected on a plantation in a year is very great. The hearths of the negro-houses, under the supervision of the driver, should be swept once a week, and the contents deposited in *covered* barrels. Live cotton-seed and salt-mud together, (they should invariably be united, if possible,) in the proportion of only ten bushels of the first to the acre, and forty cart-loads of the second, is a manure of extraordinary value for high or low grounds, especially the latter. Double the quantity of cotton seed would insure a large return. From the experiments of Sir H. Davy, the quantity of nutriment in corn-stalks is very considerable—1,000 parts, giving 84 parts of ashes, and 1,000 parts of those ashes affording 72.56 of soluble matter. As immediately after harvest, which is the proper time to put them in the ground, in order to retain their saccharine and other enriching properties, is the season for gathering Cotton, from which the labor of the grower cannot be diverted, the

corn-stalks at a subsequent period, even after the cattle and atmosphere have deprived them of much of their power of doing good, if thrown into the cattle pen, would prove to be a judicious, and highly profitable expenditure of labour.

Without any attempt to enter into a scientific investigation of the principles that should regulate the planter in his plan of making composts, it may be necessary only to remark, that, whilst Cotton requires well rotted manures, (to bring on a disposition in the woody fibre to decay and dissolve with a view to this end is the great aim of summer listings,) too great a degree of fermentation ought to be avoided, because the results, like those of combustion, would be the destruction of their most useful parts. Whenever the manure is perfectly cold, and so soft as to be easily cut with the spade, decomposition, which should have been completed in the soil is already finished; consequently, the chief elements of nourishment to plants,—carbonic acid and ammonia, are entirely lost. To preserve the entire product of composts, as far as that object is attainable by human agency, and to prevent the dissipation of their ærial or gaseous particles, the use of retentive absorbents is indispensable. A stratum of clay sustaining the heap to receive the fluid parts, and a covering also of clay to hold fast the disengaged elastic matter, will, in part, accomplish these important designs. According to the statement of Dr. C. T. Jackson, in his report on the Geological and Agricultural Survey of Rhode Island, a compost made of three parts of peat and one of stable manure, is equal in value to its bulk of clean stable dung, and is more permanent in its effects. By substituting salt-clay-mud, in which is a large portion of marsh-roots, for the peat, a compound is furnished, of as great intrinsic worth to the grower of Long Cotton, as that so warmly recommended by Dr. Jackson is to the New-England farmer. Into the cattle-pen, a level, though not a hollow or very low spot having been selected for that purpose, spread mud of the kind just mentioned about one foot thick, then add four or five barrels of lime. Upon these let the cattle trample for eighteen or twenty nights; then recommence and continue the same process until the requirements of the planter are satisfied. The lime, says Dr. Jackson, decomposes the peat, (mud) neutralizes the acids, and disengages the ammonia. The peat absorbs the ammonia, and becomes in part soluble in water. To the

compost heap, pine-straw and salt may be advantageously added. Independently of its utility as the destroyer of vermin,* salt in small quantities has a septic power, and as its capacity of attracting moisture is well known, it is strongly recommended for high land, especially where there is much vegetable matter. Pine-straw has an acid principle which is corrected by the lime. As it is very slow of fermentation, its beneficial influence, although comparatively weak, endures for a longer period than any of the crude substances yet noticed. As a retentive absorbent it is highly prized.

The stock of putrescible substances annually collected on the Island, (Edisto,) is perhaps large enough to secure a fair return of the products of the field, but from waste and a misapplication of efforts, much time and labor are uselessly consumed. To the desultory remarks on this head already offered, a few observations, with a view solely to excite reflection, will now be submitted. To augment, and not to diminish the supply of vegetable matter which nature or art might furnish, is too plain a proposition to be denied. Why then are potato vines so frequently used for cattle? This substance so abundant in quantity, and so rich in nutritious proprities, constitute a cheap and effectual instrument of renovation. The practice, therefore, of not giving it back to the land, is attended with consequences than which, if the destruction of the capacities of the soil were designed, none other would be more speedy and certain in its hostile operation. The plan of passing the cattle-pen over the land in the summer months is not unusual. Where the ground is not listed as soon as the pen is removed, the benefits of this mode of improvement must necessarily be very inconsiderable. The volatile parts of the dung, comprising nearly all that are of a fertilizing character, are certainly soon dissipated, as the nose without the aid of science assures us, and nothing remains but the salts, the amount of which is too meagre to exercise a decided influence on vegetation. All doubts on this subject will quickly disappear if the following experiment be tried on two adjoining acres:—let the one be partially listed, and

* Salt, in the proportion of one quart to the task-row on the list, or one pint below the list, and another above it, may be pronounced an effectual preventive to the attack of bugs at the *roots* of Cotton.

the other remain without any part of the sward being removed. The growth of Cotton on the former, and the display of fruit, will at once satisfy the most incredulous, that that is by far the preferable mode. Late in the fall, when the power of the sun is weak, and a complete listing can with impunity be effected, the disparity between the two methods will be much more striking. Akin to this practice, is that of using every means to bring about decomposition in vegetable matter by putting it in low spots, where excess of wetness first deprives it of a large portion of its treasures, and then gives it to the air; or of placing it in heaps on the edges of creeks, by which the liquid parts are daily washed away, instead of allowing the process of fermentation to begin and terminate under the soil. When the time arrives for removing the composted manure, the cartings of one day should be buried on the next. Wherever this is done, the enriching ingredients of ten loads will be found equal to about thirteen or fourteen loads that are suffered to lie exposed two weeks in the field. After the removal of the cattle from the pen, to protect the dung-heap from the action of the sun, a covering of pine-straw, or even a thick layer of bushes, is advisable, if not very necessary.

The importance of the subject about to be briefly noticed, must plead our apology for introducing it at the conclusion of our labor.

Within three years other agents than that of human power have been resorted to in separating the seed from Cotton. At this time a few planters still depend on the common treadle gin, but the propeller is steam; others use another machine, distinguished from the foot-gin chiefly in the length of the roller, to which steam or horse-power is applied. The former produces only about twice the quantity of Cotton as the treadle-gin when the human foot is employed. Its advantages, therefore, when the outlay and incidental expenses are brought to view, are inconsiderable. The latter gives generally about 200 lbs. per day. On the debit side the items do not subtract materially from the interest of the capital employed. The objections to Farris's gin, are, first, that it works irregularly, and that unless the adjustment of the parts to the whole be entirely true, no calculations as to its performance can be made; and secondly, that from the rapidity of the motion, which, for a

profitable daily yield, must be kept up, the staple of the Cotton is injured. The first disadvantage is undeniably a strong one, but the last is at least problematical. Steam applied to Farris's gin has so far afforded more satisfaction than any other scheme of accomplishing the object of the Planter yet tried. It is, however, certain, that a machine for detaching the seed from Sea-island Cotton, without impairing some of its valuable properties, is still a disideratum; and as large expenditures of money and labor have been fruitlessly made in this and other countries to attain an end so desirable to the grower, the task may be pronounced embarrassing and full of difficulties. If, nevertheless, the labor of ginning Cotton cannot be essentially abridged, mechanical aid could and ought to be made subservient to the preparing of it for the gin, and for the bag, and for packing it. In reference to the last operation, why is not the screw used? This mechanical agent is equal to the power of about 20 men; in other words, with one boy and a mule, it can do in a day as much as 20 men can accomplish in the same time with the pestle. As the pressure of the screw is equal and regular, no damage whatever to the staple can ensue from its action; on the contrary, the repeated blows of the pestle, always of a wedge-like shape, must in some degree operate injuriously. As it is believed that the ship-owners give a decided preference to the square over the round bale, if there be no weighty objections on the part of the manufacturer, which can easily be ascertained, the Planter would consult his interest by substituting the screw for the present clumsy instrument for packing Cotton.

From the tenor of this essay it will readily be perceived, that the resources for fertilizing the lands of the sea-board are nearly as variant as they are abundant. If our Planters would discard the ignoble principle that science is unnecessary to their success—if they understood the manner in which manures act—the best modes of applying them, and their relative value and durability—if they had but a slight acquaintance with the nature of soils, and of the habits of plants, how infinitely more interesting, more worthy of their regard and high calling, and conducive to their individual prosperity and the public weal, would be their field labors, and all the duties inseparably identified with their profession! The spirit of inquiry, however, is abroad, and

unless those whose exalted privilege it is to plead before the people the cause of the Planter, and before him his duty to himself and his associates, do not relax in their honorable and patriotic labors, the period is not very remote when Agriculture will be cultivated in South-Carolina not only because it is the instrument of wealth, but for the nobler reason that it elevates, refines, and expands the intellect.

WHITEMARSH B. SEABROOK,
Chairman.

REPORT OF THE COMMITTEE APPOINTED BY THE AGRICULTURAL SOCIETY OF CAMBRIDGE, S. C., ON CORN.

The Committee on Corn have to Report, that owing to the remoteness of their situation, from each other, they have been deprived of the advantages of a free communication and comparison of views of the subjects referred to them, which would have greatly assisted them in preparing a report, more satisfactory to themselves, and of more practical benefit to the Society.

There are, however, a few propositions of acknowledged worth and of general application, in relation to the growth and cultivation of Corn, which cannot be reported too often, and which they regard of sufficient importance to be submitted to the consideration of the Society.

The first duty of the planter, in order to ensure success to his crops, is the careful and thorough preparation of his land. It should be an inflexible rule, not to deposit seed in the ground, until it is in a proper state for their reception. Whatever is done by the planter, should be well done, is an axiom so universally true, both in principle and its application to the every day business of his avocation, that he never should be unmidful of the lesson which it inculcates.

The next step which is a measure of equal importance, is the selection of seed. That variety is to be preferred, which will yield the greatest product to a given number of acres, reference being had to both weight and quantity.

The Committee have paid some attention to the different varieties of Corn, and from their observation and the information of several intelligent planters, they are persuaded that the best variety with which they are acquainted, is a species of the white gourd seed, remarkable for the large size of the cobs, the number of rows of grain, and the compact order in which the large and well shaped grains adhere to the cob. The number of rows of grain vary from 18 to 24, sometimes they run as high as 26, and in one instance they reached the extraordinary number of 32. In Fairfield, this variety is called the Cook Corn, and is highly prized by the

best planters of that enterprising District, as being superior over the common kind both in quality and quantity of grain. It is represented to yield four or five bushels to the acre more than the ordinary variety in the country. In comparing this variety with the corn which Edward Kirksey, Esq., of Pattersonville has been planting and improving for some years past, we are convinced that it belongs to the same species, if it be not the identical kind. The Committee beg leave to state, that some of its members have tried the Kirksey corn, and with much confidence in its superior qualities, they embrace the occasion to recommend it to the notice of the Society. When the planter shall have satisfied himself that he has procured the best variety for productiveness and for its adaption to his soil and climate, he should then charge himself with the further duty of making an annual selection from his fields before the crop is gathered. In making this selection, the Committee are aware of but one general rule to be observed, the selection should be made from the earliest and healthiest stalks, having two or more ears, and from none other. It has been a question, somewhat meeted, whether the upper or lower ear should be taken, but is now generally conceded that the top ear is to be preferred. A satisfactory reason may be assigned in favor of the top ear arising from the laws of vegetable physiology. The food of all vegetables is first received into the small vessels, with which the roots are supplied, while it is held in a state of solution by water, and conveyed through the pith and spiracles of the stalk to the leaves, when it undergoes an essential change and is elaborated into suitable aliment for the plant. It is then diffused through the organs of the plant by means of the bark in its return passage to the roots, imparting in its progress the elements of nutrition to the growing plant. In the return passage of these nourishing juices, it does not appear improbable, that the top ear should appropriate to itself the richest portions, and be thereby enabled to attain the largest growth. Whether this hypothesis be philosophically true or not, the fact is indisputable, that the top ear is usually the largest, and therefore to be preferred.

The planter must at this stage determine in favor of some one of the various modes of planting corn, which are practised in this section of the State, and are as follows: The first and probably the oldest mode is in checks five feet by five, with two stalks in a hill; the second in checks four by four, with one stalk in a hill; the third five feet by three, with one stalk in a hill; and the more recent mode in drills of unequal distances, as suits the taste of the planter, or the character and strength of the land. The first mode is obnoxious to an insuperable objection, arising from the fact, that at the present time there is but a small portion of our lands of sufficient freshness and fertility to bring to maturity two stalks in the same hill with perfect ears of corn on them. The roots of corn are fibrous, and penetrate the earth for some feet around the stalk, and when there are two in a hill they not only intermix with

each other, but require a double portion of food and moisture, which too frequently exhausts the soil of its supply of each, leaving the stalks to perish for want of sustenance. This was the common mode in the early settlement of the States, when the lands were in their virgin strength and freshness, but is now abandoned as unsuited to the present condition of the country.

The next plan of planting four feet by four in checks, with one stalk in a hill, avoids the foregoing objections but is nevertheless, not without its defects; by this mode the corn is too much crowded for the free passage of heat and air. We are persuaded in order to make corn in high perfection, such distance is fundamentally necessary, one way at least, as will admit of the free admission of air, heat, and light, the essential agents in bringing corn to a high state of productiveness. The mode of planting in checks five by three is much more favorable in every point of view than four by four; in effect it gives greater distance to the plants, which will allow of a free circulation of air and heat, and at the same time increases the number of stalks upon a given space of ground, and to that extent augments the production of the crop. The number of stalks on a square acre of ground planted in checks five by three, will exceed the number planted four by four by something upwards of two hundred and thirty, as will be apparent to every one who will square the distances at which the corn stands according to both plans, and ascertain the difference. By this mode of planting and by commencing the cultivation of the crop by planting first the wide way and next the narrow way, then the wide way at every subsequent working, the roots are never disturbed the narrow way but once, and that at a time when the plant is in vigorous growth and when the partial cutting of the roots tends to the multiplication and the consequent increase of vessels for the reception of food. At this stage in the growth of corn, cutting the roots is no injury but rather benefit; of all the modes of planting corn in checks, we regard this as liable to fewer objections, and presenting more advantages than any other. We are inclined to believe from recent experiments that the drill culture is preferable to either of the foregoing, and is destined ere long to supersede them all. It recommends itself to the favorable consideration of the planter as being better adapted for the retention of moisture for the prevention of washing and for the equal if not increased production of the land.

The preparation of the land should be made in beds five feet, or five feet six inches wide, with such direction given to the rows, having reference to the slope of the field, as will admit of the easy and gradual passage of water into the adjoining branches or prepared water drains, without serious damage to the land.—If the drills are well prepared and thrown up by bar-ploughs into well defined beds, a large portion of falling water will be absorbed and retained in the drills on high lands, instead of running with destructive speed to the vallies, as is too often seen in the check

system, washing up the corn, and injuring the land in its progress. —On high land the corn should be planted in the water furrow, at the distance in the drill of thirty inches or three feet, as may be most suitable to the age and strength of the land, and covered with the plough by running two furrows. If the planter uses manure as every one should do, it is advisable to scathe it along the entire drill and drop the seed-corn upon it. The use of the plough in covering corn and the manure at the same time will protect the latter from evaporation and the former from being washed up by rain. If the land should be in good order, the corn will come up well without further attention, but ruff and cloddy—it will be advisable to run the harrow over the corn the fifth or sixth day after it has been planted. On bottom or low lands especially if they are inclined to be wet, it is safer to plant in the middle of the beds, planting and covering as above recommended. The system of planting in the drill is far better adapted to the purposes of draining, low and moist land especially if the fields lie in the least degree undulating, as it enables the planter to give that direction to his drills through which the water will naturally flow, and by which the redundant portions may be discharged from the surface of the land.—The treatment of plants and vegetables under ground, should be somewhat analogous to that bestowed upon them above the earth. The moderate topping or pruning of plants at the proper season is thought to improve their vigor and increase their fruitfulness, but the excessive use of the knife at any season will cause much injury by producing a violent derangement in the circulation of the fluids, in consequence of which, the growth of plants is not only greatly retarded, but their destruction in many instances rendered inevitable;—these effects are produced with equal certainty, whether violence is offered the plant by pruning its limbs to excess, and cutting its roots to excess. Hence it is that crops of corn are too often damaged by the injudicious use of the plough, cutting and tearing asunder the roots, during the continuance of any and adverse seasons, especially where the corn has been planted in checks. This injury may be measurably avoided by pursuing the drill system, as in it a portion of the roots are never disturbed by cultivation, but remain in their natural vigor to collect nutriment for the growing crop up to the period of their maturity. The drill system therefore recommended itself to our adoption from the fourfold consideration of its better adaptation over all others, to retain moisture on high and rolling land, to drain off water when it has fallen in abundant quantities, to preserve the land from washing by allowing the drills to be run suitably to the position and character of the fields, and lastly, to yield as large, if not larger crops, to a given quantity of land, with the same labor.

All which is respectfully submitted by the Committee.

WHIT. BROOKS, *Chairman.*

[*Edgefield Advertiser.*

LECTURES ON AGRICULTURE.

Three Lectures on Agriculture, delivered at Oxford, on July 22nd and Nov. 25th, 1840; and on Jan. 26th, 1841; in which the Chemical Operation of Manures is particularly considered, and the Scientific Principles explained, upon which their efficacy appears to depend. By Charles Daubeny, M. D., F. R. S., M. R. I. A., &c., Sibthorpian Professor of Rural Economy in the University of Oxford. Oxford, 1841. 8 vo., pp. 106.

In the preface, the author informs us that he was honored by the Council of the British Association to prepare a report on the "Connexion between Chemistry and Agriculture;" and that he readily undertook this office, in consequence of having been appointed to deliver Lectures on Rural Economy in the University of Oxford:—"In these Lectures, although I freely own myself indebted for the fundamental doctrines that have been laid down, as well as for many of the details that have been dwelt upon, to the work of Professor Liebig; yet it is fair both to him and to myself to state, that I have interwoven much matter that is either my own, or drawn from other sources than those of his work; that I have often attempted to deduce from his principles consequences for which he is nowise answerable; and that I have endeavoured to remove any impediments that may exist amongst agriculturists to the reception of the novel views propounded in his report, by giving to my exposition of them as much as possible of an English character, both as to style and arrangement, and by disencumbering it of all such references to recondite chemical truths, as did not seem essential to the establishment of the leading propositions."—p. vii.

In the first Lecture, after explaining the circumstances that have so long retarded the execution of the munificent intentions of the founder of the Sibthorpian Professorship—viz., the expense of publishing the "Flora Græca"—the Professor proceeds to give a "sketch of a few points connected with the subject of Rural Economy, on which the kindred sciences of Botany and Chemistry may be expected to throw light." We shall confine ourselves, in the present notice, to the quotation of a few of these points:

"It must be obvious, that although to proceed in one unvarying routine of practice might require only a knowledge of the plants actually cultivated, and of the weeds which accompany them, yet that to improve upon existing methods, or to adapt received ones to an altered condition of circumstances, demands some insight into the general structure and functions of vegetables, and into the relations of their members one to the other.

"Thus, for example, the principles on which we proceed in protecting plants from the influence of frost, are derived from the knowledge possessed with respect to the circulation of the sap, and consequently as to the means of suspending it.

"Proceeding upon these data, the gardeners at Nice and Genoa, whenever a severe frost sets in, pluck off the leaves of their orange-trees, by which means the sap ceases to rise, and the injury which would be done to the trunk by the freezing of its aqueous juices is thereby prevented.

"Thus the very system of arranging the succession of crops, presupposes some acquaintance with the relations of the plants themselves; and in introducing any fresh member into the cycle, its place in the series should be determined by considering the natural family to which it belongs.

"Nay, even in the common operation of trenching, the damages occasionally done to the contiguous timber would have been prevented, if the husbandman had been always aware of the dependance of trees upon the extreme points of their roots, and of the great distance to which the latter extend.

"The fit period for collecting the fruits of the soil depends upon the physiological fact, that the farinaceous matter which constitutes the nutritive portion of those tubers, that serve for food to man, being designed for the nourishment of the bud, begins to be consumed so soon as the latter starts into existence.

"Hence the propriety of approximating as nearly as possible to the point of time at which the whole magazine of nourishment is accumulated, and none of it has as yet begun to be expended.

"An interesting method of making use of frozen potatoes, and even of applying frost as a means of preserving them for an indefinite time, has been suggested by a more intimate knowledge, derived from microscopical investigation, with respect to the minute structure of the parts in which the fecula resides, than we had previously possessed.

"It appears that the acrid matter contained in the rind of the potato, in common with all the members of the nightshade family, is not mixed with the other fluids of the cells of the tuber, so long as the latter is in a sound condition; but that when frost has separated these cells one from the other, the fluid then extravasated flows into these interstices, and the acrid and venomous matter dissolved by them partakes of the general diffusion. Hence, the starch becomes unwholesome and unpalatable, and is rejected both by man and brutes.

"Now, it has been found that the starch which we convert into nourishment is contained chiefly in the cortical layers of the tuber, and the acrid matter in the epidermis; so that in a sound state of the tuber, the two do not intermix; and if we can only prevent this from happening to the potato after it has been frozen, we shall obtain it in as wholesome a condition as before. Now this is effected by drying the potatoes as quickly as possible after they have been thawed, a practice, indeed, which had been adopted from an early period by the Peruvians, and which enables them to take advantage of a superabundant crop, by freezing the overplus, to

destroy their vitality, and afterwards rapidly drying them, so as to preserve them for an indefinite time.

"It has also been found that the reason why frozen potatoes supply very little starch, is not that this principle is destroyed, but that, owing to the cells which contain it being detached one from the other by the act of freezing, the process of rasping, by which the starch is usually separated, does not tear them open, so as to dislodge their contents.

"If, however, it be thought that the cultivation of plants, although explicable, of course, on physiological principles, having, nevertheless, been derived from experience and observation, may be pursued successfully without the lights of modern science; it must, at least, be admitted, that the same conclusion cannot be extended to those circumstances by which their growth is affected, whether derivable from the nature of the soil itself, the adventitious matters superadded to it, which we denominate manures, or those influences of a still more subtle description, that come under the general denomination of climate.

"Here we have a wide field open to us, in which the aid of chemical knowledge is most important, and where it will be difficult for the farmer even to keep his footing, and still more to extend his conquests over nature, if he neglects to avail himself of those arms, and that improved system of warfare, which science places within his reach." pp. 9—12.

We now proceed with the professor, while he points out the prominent subjects of investigation which fall under the jurisdiction of the agricultural chemist:

"Whence do organic bodies obtain the principles which enter into their composition, and become assimilated to their living organization?

"With regard to the animal kingdom, indeed, the answer to this inquiry is more easy. It seems to be generally admitted, that no substance can enter as a constituent into any fabric, which has not previously made a part of some organic matter.

"Animals, it would appear, derive their support, directly or indirectly, from vegetables, carnivorous species feeding on herbivorous ones, herbivorous ones being supported by vegetable matter alone.

"It is a matter of the first importance to ascertain, whether plants can derive from the air all or any of the principles which enter into their composition, since upon this will depend our decision, as to the degree in which animal manures are requisite, how far mineral ones admit of being substituted, and to what particular kinds of plants they are most applicable.

"Here then it is evident that the aid of chemistry is indispensable, whether it be our object to determine the constitution of the plants themselves, that of the soil in which they grow, that of the

substances which are superadded to the latter as manure, or lastly, that of the foreign matters, subservient to vegetation, which may be diffused through the atmosphere.

"Another important line of research, by which the chemist may afford essential service to the agriculturist, relates to the operation of manures.

"These are in general distinguished into organic and inorganic: the former consisting of the excrements of various animals, or of organic substances in a state of decomposition—the latter, of the various saline and earthy matters, which may be mixed with the soil.

"The former description of manure has been already noticed—its action is doubtless that of imparting directly to the vegetable those principles which enter into its composition, such as azote, carbon, &c.; and likewise perhaps that of stimulating its organs to a more vigorous discharge of their respective functions, thus enabling it to extract a more abundant supply of nourishment from other sources likewise.

"But the action of mineral manures is more complicated and less perfectly understood; and hence, in applying them, we are often guilty of the fatal error of administering that, which has been found a valuable medicine for one description of plants, to a crop of totally different habits.

"In what manner, for example, does saltpetre, or that valuable substitute for it lately introduced, nitrate of soda, operate upon the plant which is so effectually benefited by the application.

"Do these salts act merely as stimuli, or do they also communicate to the vegetable any of those principles which enter into its component parts?

"If the latter be the true solution, does the nitre itself become assimilated, or is the nitric acid which it contains decomposed, so as to furnish the nitrogen required by the plant?

"The determination of these questions would suggest to us means for discriminating, both the quantity of nitre which should be applied in each instance as a manure, and likewise the description of plants to which it is likely to be advantageous; and hence, amongst the chemical researches by which agriculture is likely to be benefited, may be numbered that of ascertaining, by an accurate analysis of the soil, both before and after the crop is sown, whether the amount of nitric salt added has undergone any diminution during the intervening period.

"A third branch of inquiry relates to the cause of that failure, which is noted as taking place in a crop when it has been introduced a second year into the same soil, or when it has succeeded another of the same natural family—a research, upon which depends the whole doctrine of the rotation of crops, which has already worked so important an improvement in the art of husbandry, wherever it has been adopted in practice.

"It has been argued, that the failure alluded to cannot altogether arise from the exhaustion of the soil, for in that case no other plant would be sown after it with advantage; but its explanation must in part be sought for, either on the principle that each crop requires some particular pabulum, of which the soil may contain only a definite amount, or by assuming, that every species of vegetable imparts to the soil something, which to its own species is noxious, but to others may be nutritious.

"The former is the old and still the more generally received theory: the latter is one which has been recommended by the weighty authority of the great Genevese botanist, Mons. Decandolle.

"According to the latter author, the extremities of the roots in all plants not only absorb nourishment from the ground, but likewise at the same time impart to it in return something derived from its own substance.

"It has been observed, for instance, that if we place a plant in sand moistened with distilled water, the roots disengage, during the night, little drops of some fluid, which after a time concrete into a solid form.

"Now this fluid is considered by Decandolle, to hold the same relation to the vegetable, which the excrement bears to the animal; and, as the latter constitutes the food of other tribes, so the former affords nutriment to certain plants, whilst it is injurious to others, and more especially so to those of the same species from which it had itself been derived.

"This is the reason, why some plants thrive, and others languish in each other's vicinity; it explains why the cirsium arvense, for instance, is injurious to the oat, whilst the presence of certain species of orobanche seems to favour the growth of flax, and also thrives itself most in the midst of this kind of crop.

"That these supposed exudations are uniformly more or less injurious to plants of similar species, has been inferred, from the acknowledged fact, that a soil, in which peach or apple-trees have grown, is unfit for young shoots of the same description, so as to render it a necessary rule in practice, that a piece of ground should be occupied by forest and by fruit-trees alternately.

"Reference has also been made to a circumstance, which most travellers in the United States have remarked, and which I myself, during my tour in that country, had frequent opportunities of substantiating, namely, that where a forest of oak or of maple has been destroyed, the trees, that are apt to shoot up spontaneously in their place, are of the fir-tribe; whereas, if a pine forest be cut down, young oaks and other allied species will make their appearance afterwards.

"This same conclusion has also been supported by some experiments, which, at the suggestion of Decandolle, were instituted at Geneva, by Mons. Macaire. Prinsep.

"Thus, fresh roots of the chondrilla muralis, being each day introduced into a portion of distilled water, imparted to the latter, at the expiration of a week, an odour resembling that of opium, together with a bitter taste; and even the roots of the kidney-bean, when placed in a vessel of water, communicated to it indications of the presence of an excreted matter, of which a large amount was afforded during the night than the day.

"Macaire also found, that when poisonous substances, such as sugar of lead, had been absorbed by one parcel of the roots, they would be at the same time excreted by another.

"Nevertheless, in spite of these apparently direct experiments, opposite results have been obtained by others; as for instance, by Mons. Braconnot*, who states, that in many instances he could discover no signs of any such exudations, and that in others, as in the case of the common lettuce, where he did detect them, their presence ought to be attributed to a laceration of the fibres of the roots, and a consequent extravasation of the fluid they contain.

"This he supposes to have happened in the experiments of Mons. Macaire; and he further remarks, that the poppy (Papaver somniferum) has been planted ten years successively at Nancy, without any failure of the crop accruing; nor did he afterwards find in the soil sufficient of any matter, which could be traced to the plant, to justify the inference, that it had continued throughout that long period, exuding matter from its roots.

"He also accounts for the transmission of the sugar of lead from one parcel of roots to another by capillary attraction, and maintains accordingly, that it may be prevented by surrounding the stem externally with bibulous paper."

The professor concludes his first lecture by stating, that he has been for some time past carrying on, in the Botanic Garden, Oxford, a series of experiments, with a view of deciding between these conflicting authorities. [*The London Gardeners' Gazette.*

ON PLOUGHING IN GREEN CROPS FOR MANURE.

From the Third Report of the Agriculture of Massachusetts.

Boston, March 25, 1840.

Dr. S. L. Dana,—Dear Sir,—Two successful and experienced farmers, one in Franklin and one in Berkshire county, have come to the conclusion that, in turning in crops by way of enriching the land, more benefit is derived, that is, the fertility of the land is more advanced by ploughing in a crop after it has become dried or dead, than by turning it in in its greatest luxuriance and greenness. One of them showed me the results of an experiment tending to this point which appeared strongly to favor his conclusions. A

* Annales de Chemie, 1839.

well-established fact is better than the most elaborate hypothesis; and prejudice, however strong must yield to facts.

Allow me under these circumstances, to inquire whether, upon your principles or philosophy of vegetation, there occur to you any good reasons for a result so much at variance with popular opinion. Your views in full on this subject, will add to the obligations under which you have already laid the public and your respectful friend and servant, HENRY COLMAN.

Lowell, March 28, 1840.

Dear Sir:—The results referred to in your letter are opposed to the common opinion. Common opinion, especially in agriculture, is not always founded on observation. It is oftener prejudice, than opinion; and when inconsistent with well known facts, has not its source in observation or experiment. The whole resolves itself into this, *dry plants give more geine than green.* This follows from the little we know of the process termed "fermentation;" I use the term as commonly expressive of the spontaneous decay of vegetables. It includes the three stages of vinous, acid, and putrefactive fermentation. These are not necessarily dependent, following in regular progression. They are not cause and effect. Putrefaction may commence first, and it is so different from the other two, in all its stages and products, that the term "fermentation" ought never to have been applied to it. The greater part of vegetables are susceptible of putrefaction only, a small number become acid at once, and a still smaller number ever undergo vinous, acetous and putrefactive fermentation. Fermentation then in its widest sense, will help us to understand how dry crops may be better manures than green. Let us glance at the principles and products of fermentation.

1st. What vegetable substances are susceptible of the vinous fermentation, and what are its products?

The juices only which contain sugar and starch, are convertible first into gum and then into sugar by the action of *azotized* vegetable principles, especially gluten. Pure sugar never ferments. The vinous fermentation must be excited by some substance containing nitrogen. There are three things necessary to vinous fermentation, air or oxygen gas, moisture and a temperature never below 50° F., nor above 86° F. The products of this process are gasses, ferment or yeast, and vinous liquor. The gasses are carbonic acid and hydrogen. The yeast proceeds from a change in the organization of the gluten and albumen; some late French experimenters thinks it proceeds from a continued evolution of insorial plants, hence yeast begets yeast, like sowing crops of seed. However, let us leave speculation. The main facts are as above stated. If then, we plough in green plants, we put them in a temperature favorable to the commencement of vinous fermentation; we bury them full of sap—the requisite moisture for vinous

fermentation;—we cover them whilst their saccharine principle is in its perfection. Every thing favors vinous fermentation. The sugar and starch of the plant fermented by its gluten and albumen, are converted into gasses and alchol, the former are lost in air, the last washes away or is changed into vinegar. All that remains for the farmer, is the altered gluten and albumen, which soon putrefy and form geine. All the starch and sugar of the plant are thus lost.

2d. What vegetable substances are susceptible of the acid fermentation, and what are its products?

The substances are first, sugar, which in certain cases becomes acid, without undergoing vinous fermentation; second, gum. The circumstances essential to acid fermentation are air, moisture, and a temperature from 65° to 70° F.; acetic acid is itself the proper ferment of acid fermentation. Vinegar, as is well known, singularly promotes the formation of vinegar in vinous liquors. The products are: carbonic acid, acetic acid or vinegar, and some other acids, especially that called nanceic or zumic acid, which if not lactic, is perhaps only acetic acid holding in combination some azotized substance. This acid combines with the alkaline and earthy ingredients of plants and soils, and forms very soluble salts. Green plants ploughed in, are at once placed in a situation most favorable for undergoing acid fermentation. We suffer a loss of a part of the carbon, and in addition to the sugar and starch, we now lose the gum of the plants. All these are capable of producing geine, and hence in ploughing in green crops, we lose a portion of the manure.

3d. What are the vegetable substances susceptible of putrefaction and what are its products?

With the exception of oils, resins, &c. every organized part of every vegetable may putrify. The circumstances essential to this process, are air, a temperature not below 45° and moisture. No perfectly dry plant ever putrefies, nor will a moist one if air is excluded. I have had a capital example of the last, in a piece of a white birch tree, dug up from a depth of twenty-five feet below the surface in Lowell, this winter. It must have been inhumed there probably before the creation of man, at least a time "whereof the memory of man runneth not to the contrary," yet this most perishable of all wood is nearly as sound as if cut last fall. A dried plant has parted with most of its sap, that moisture essential to the vinous and acetous fermentation. During the very act of decay from the moment when its living functions have ceased, new combinations of its elements begin. It has already begun to be destroyed by the very agents which gave it life. This is the beginning of putrefaction. Let us not be deceived by a name. Putrefaction we always associate with disgusting effluvia. But in the wide sense we have defined it, it includes also the fragrance of new hay. Whenever bodies consist only of oxygen, hydrogen, carbon, and a trace of

azote, their putrefaction is fragrant or inodorous; when in addition to these, bodies contain large portions of azotized matter, gluten, albumen or sulphur, and phosphorus, putrefaction evolves abominable odors. To the agriculturist, putrefaction is always a wholesome process, beneficial to his best interests, when promoted and controlled. There is only one case where this process produces loss. This may be termed *destructive putrefaction;* it is produced by heaping together green plants, or sometimes by moistening dry vegetable substances. Here oxygen is rapidly absorbed, and finally the mass takes fire and burns. Up to the moment of inflamation this is putrefaction. New hay, stacked too green, is a familiar example. Volumes of steam are evolved, which proceed partly from the decomposition of the plant; decompositions and recompositions rapidly ensue; these are the ferment which keeps up the action till the plants burn. Doubtless all green plants, ploughed in, undergo to a greater or less extent, destructive putrefaction, which succeeds the vinous and acid fermentations, perhaps caused by the very rapidity of these processes. Hence, in addition to sugar, starch and gum, of the plant, we lose a large portion of its other substances, by turning it in green. The product of this rapid fermentation has been but little studied. Happy the farmer who never witnesses the process. He should never induce it, and may generally prevent its extension when once begun. It is a dead loss to him; but in all other cases of putrefaction the products are valuable. These vary according as the process takes place: 1st, in air; 2d, at the surface of the ground; or 3d, deep in the interior of the earth. The last need not detain us—it produces all the varieties of coal.

1st. In the free air, having access to all parts of a plant, putrefaction produces carbonic acid, nitric acid, and water. But ordinarily, in the air, as oxygen does not find ready access to all parts, a portion of the hydrogen of the plant combines them with the carbon, sulphur, phosphorus and azote of the plant, and we have carburetted, sulphuretted, and phosphuretted hydrogen, and ammonia produced. Now, as these exist but in small quantity in vegetables, the loss of hydrogen will not be very great by drying the plants, and it is possible, that the removal of these may cause the other elements to enter into more stable combinations better fitted to produce geine. In all cases of putrefaction in the open air, oxygen is absorbed, and an equal bulk of carbonic acid given out, while, at the same time, the oxygen and hydrogen of the plant escape as water. The result is, that in the substance left, carbon exists in a greater portion than in an equal weight of fresh vegetables. In all cases of putrefaction, new products are formed; these again resolve into others; and this action goes on till we have no longer any organic products; we have only binary or inorganic substances left. All our researches into the philosophy of the changes in fermentation, terminate in these binary products, that is,

in compounds, consisting of only two elements. During all these various changes, a variety of substances must of course be formed. As the elements of living, so the elements of dead plants, are continually changing into new forms. Nature is admirably simple, and never so learned as our books. We ought not to dignify with a new name, every new product of putrefaction, which we may fortunately arrest. However various these products may be, whether products or educts of putrefaction or of our analytical methods of separating them and all putrefaction at the surface of the earth, ends by forming a brownish, black, powdery mass, which combines with the alkaline, earthy and metalic bases in the plant. This substance has been called "*geine.*" As I have elsewhere defined it, it is the decomposed organic matter of the soil. It is the product of putrefaction; continually subjected to air and moisture, it is finally wholly dissipated in air, leaving only the inorganic bases of the plant, with which it was once combined. Now whether we consider this as a simple substance, or composed of several others, called crenic, apocrenic, puteanic, ulmic acids, glarin, apotheme, extract, humus, or mould, agriculture ever has and probably ever will consider it one and the same thing, requiring always similar treatment to produce it; similar treatment to render it soluble when produced; similar treatment to render it an effectual manure. It is the end of all compost heaps to produce soluble geine, no matter how compound our chemistry may teach this substance to be.

Among the many economical modes of producing geine, the ploughing in of vegetable matter, has held a high rank. Nature teaches us to turn in the dried plant. Dried leaves are her favorite morsels, and the fact that nature always takes the dried plant, from which to prepare the food of growing vegetables, should have taught us long ago, the wisdom of ploughing in dry crops. The careful collecting and husbanding of dried leaves, their superior efficacy in forming compost, bears witness to the facts stated in your letter. That the use of dried leaves for compost, has not led to the turning in of dry crops, has probably arisen from the fact that a greater quantity of geine may be produced, by turning in two or three crops in a season, than by one crop of dry. This needs experimental confirmation. The very act of tillage, on Mr. Keely's plan, by exposing the insoluble geine of one crop, to air, renders it soluble, while at the same time, two or three green crops must form a greater quantity of salts. If only one crop can be turned in, let that crop be dry. All our philosophy, and the late experiments of your agricultural friends, confirm this view.

With great respect, I am very truly, yours,

SAMUEL L. DANA.

Rev. H. COLMAN, *Agricultural Commissioner.*

PREPARATION OF SEED CORN.

Messrs. Gaylord & Tucker,—I send you the result of an experiment made in planting corn the past season. Having seen statements of the benefits derived from steeping the seed in a solution of the sulphate of iron (copperas,) as securing it against the ravages of birds and cut-worms, we resolved upon giving it a trial. Mr. Jacob Kirk, (with whose crop the experiment was tried,) procured a few ounces, dissolved it in hot water, and poured over the corn. After remaining in the solution from six to eight hours, the corn was taken out, rolled thoroughly in plaster, and planted. A few rows of the same kind of corn was planted in the middle of the field, without steeping the seed, but just as it came from the cob. The field was likewise planted with pumpkin seeds, also without preparation. After the corn and pumpkins had come up, I observed that many of the latter were cut off by the worms, but could not see a single stalk of corn disturbed, until I examined the rows, (for I had marked them,) the seed of which had not been prepared. Here I found the worms at work, nearly a tenth part of which they had destroyed: the birds had likewise taken some. The steeped corn was of a greener and more healthy color than the other; grew faster, with stouter stalks, while that from the unprepared seed could readily be pointed out by its more yellow and dwindling appearance; neither was the yield so great as the other.

Now whether this difference in yield is to be attributed to the copperas or to the plaster, or to both, I have yet to learn; but think the copperas prevented the birds and worms from committing depredations, as we have frequently rolled seed corn in plaster, but have never found *that* a security against either birds or worms.

The above is at your service: you will please pardon errors in composition, as my province is behind the plough and not the pen.

Yours, R. FOSTER.

[*Albany Cultivator.*

WEANING LAMBS ON GRASS.

Mr. Chipman who belongs in New-York, but has been lecturing on temperance in this State for sometime, among other matters recommends from experience weaning lambs early in the season on grass instead of late in the fall as is most usually done in this State. In the Temperance Gazette of May 14th, he publishes the following article on this subject.

WEANING LAMBS ON GRASS.

We have selected from one of Mr. Chipman's Letters, the following, as more appropriate to this department of our paper.

As the Gazette is somewhat of a miscellaneous character, I will make no apology for flying off in a tangent, now and then, and introducing any subject which may afford instruction or amusement to its readers. And among all the subjects which might present themselves to the mind of a temperance agent, I think I shall introduce the very last that might be thought of when I name that of WEANING LAMBS.---I have been, in the course of my travels in Maine, surprised to find that apparently, little attention is paid by your farmers as to the *time* when their lambs shall come. I think I have seen young lambs here in every month since December. In New-York, where wool is next to grain, our great staple, you might perhaps not see a single young lamb, in looking over five hundred flocks, previous to the first, and very few, until quite the last of April. Of the importance of attending to this point, it is not my purpose, nor can I deem it necessary, to speak; but I find so far as I have heard any thing said on the subject, that the idea of weaning your lambs, has not been heard of here. Why, sir, in this matter, you are just about fifteen years behind us at the west. I really do not think that our farmers, at this day, oftener permit their lambs to remain with the ewes until winter, than they do their calves. It is universally done. The lambs and ewes are separated in the month of August, or quite early in September—the lambs being about four months old. The ewe and lamb are both greatly benefited by the separation. The ewe gets into good plight before the setting in of winter, and the lambs of the *next* year will be stronger---less likely to die---and not only so, but the *number* will be increased. The wool of the sheep will be of better quality, and the fleece heavier. This might be expected, but the principal objection that will present itself to the minds of those who have not seen this practiced, will be on account of the lambs. It will be supposed they will suffer from being thus early deprived of their accustomed nourishment. This, however, I know is a great mistake. Put the lambs into fresh feed, and they evidently forget their dams in two or three days, and do not, even at first, as might be expected, fall away, and in a few weeks they become fat---they are more easily wintered, depending wholly upon the food you furnish them, and their appetite not impaired by the little they might still get from the dam.---Another advantage is that being thus separated, you may if disposed pay more attention to them, and give them better food than to the rest of the flock. And still another thing which I think of great importance, you may thus prevent their having increase the next year. That they ought not to have lambs until two years old, every one will agree that has had any experience in raising sheep.

My attention was first called to this subject, probably about sixteen or eighteen years ago by seeing it practiced by one or two of our best farmers. Having tried it and found its benefits, I presented the subject among others of a practical character, in an address which I delivered before the Ontario County Agricultural Society. My remarks were copied into an Almanac and the attention of the people thus generally called to it, and its *obvious* utility probably more than my recommendation, led almost at once to its general adoption.

BREAKING STEERS.

Messrs. Editors,---A correspondent in your last paper asks to be informed "how to prevent Steers from being sulky when breaking them for the yoke."

I answer--treat them with *gentleness* and *kindness*. As in the human so in the brutish species, we must expect to find a great disparity of temper and disposition; and so vicious and obstinate indeed are some that they cannot, even by the wisest means, be rendered entirely docile. Much, however, may be done by discreet management. And here permit me, *as you value a good character and a good conscience*, to warn you against all manner of cruelty, severity, or rashness, in breaking steers or any other animals.

The winter before your steers are a year old, shut the pair you wish to break into a yard apart from other cattle: yoke them and tie their tails together as gently as you can, and leave them, to break themselves in their own way, some six or eight hours; then untie their tails, take off their yoke, and let them go. Repeat this process whenever convenient, during the winter or spring, till they shall become gentle and tractable in yoking and unyoking, and shall have learned of themselves how to walk even, turn about, &c., in the yoke. You may then, if you choose, (treating them tenderly,) drive them about until they have become somewhat familiar with the words of command; but take heed you don't put them to draw a load, or permit your boys to jade them about, lest it should impair their strength or ambition. Thus trained, turn them out and let them run till you wish to work them; at which time, (even though it should be several years,) you will find them as tractable as when you last unyoked them.

But, perhaps, your steers are already two or three years old, and as untutored as the Buffaloes of the forest. In this case put them into a small strong yard, and, in the gentlest manner possible, put a yoke on one of them—taking out the spare bow---and let him go with it till he shall become familiarized to wearing it. If you have another yoke you may do the same by the other steer at the same time: if not, give them a turn about with the yoke till they become somewhat subdued. Then yoke the pair together as civilly as

possible, tie their tails, and treat them as directed in the case of the calves. When you commence driving them, if uncommonly sturdy or wild, it would be prudent to halter the near one lest they might get the advantage of you in a race; but don't rely on your halter in one hand and a short whip in the other for managing your team; you can never drive your off ox in this way; take the old fashioned cart-whip in both hands, and with this, guide, direct, and enforce your commands. On putting them to work, if with a yoke of oxen, put them, (not as is commonly practised behind, to be dragged about by the horns, but,) before; where properly managed, they will very soon become quite handy and obedient. Their temper, ambition, and constitution will be unimpaired; and, (though last not least,) your conscience will be clear from the sin—too common to farmers, as well as others—of cruelty to the brute. C****.

[*New Genesee Farmer.*

CROWS.

Mr. Editor,—I noticed in your Farmer of Saturday, May 2d. 1840, a method of driving off crows, by catching one in a trap. This is a cruel way of treatment to the poor crow taken. It also operates to the general disadvantage to the farmer, for the time that the crows absent themselves, as the destruction of them would, and this every farmer who understands the nature of the case, and the great use the crows are to the farmers, by destroying insects, knows to be a loss to him. People are beginning to be sensible of the great losses, which they have sustained and are sustaining, in their crops, by the great and wanton destruction, of late years, of all kinds of birds.

It is a well known fact that birds live on worms and insects. It is also well known that insects and worms live on vegetables. If, therefore, we destroy the birds, which live entirely on the worms and insects, we so far protect the worms and insects, whereby our crops are so much more destroyed. Why should we knowingly and deliberately do a thing having a direct tendency to the destruction of our crops, on which we depend for the support of ourselves and our stock.

Probably the greatest cause of enmity to the crow, is that he pulls up the corn. This to be sure is some vexation. But this trouble is easily remedied, and to the advantage of the farmer too. Soak the corn in some liquor, that is unsavoury to the taste of the crow, as saltpetre, pickle, tar water, then sprinkle some flour of sulphur among it, and the crow will not eat it. Whenever he finds that the corn is not palatable he desists from pulling it up, for he does not work for mischief, but for his own support. When he finds he gets nothing for this kind of labor, he leaves it, and betakes to some more hopeful employment.

And a better way is to scatter a few kernels of this unsavoury corn about upon the ground, and after tasting a few of them, he will not meddle any farther with them. The great and increasing complaints, which are abroad in the land, of the dreadful ravages of worms and insects, is owing mostly to the destruction of the birds of all kinds, especially the crow. The other policy ought to have been pursued, that of protecting, encouraging, and domesticating, as far as possible, all kinds of birds. And it is wonderful what a provision providence has made, in this department of nature's work. The insects and worms, and the birds come and disappear at the same time.

Perhaps friend K., after thinking this matter over again, and with a better deliberation, will advise his brother farmers not to trap and kill the crows, and will also adopt a different policy himself. I will conclude in Mr. K's own words: "Try it Mr. K., try it farmers, and rid yourselves and your neighbors of the tormentors," the worms and the insects. PHILO.

Portland, May 2d., 1840. [*Yankee Farmer.*

TREATMENT OF THE HORSE.

YOUR correspondent W. B. from North-Carolina, expresses a wish "*to see some extended remarks on the best manner of treating work and travelling horses;*" and you ask some of your correspondents to reply to his inquiry. To do so fully would require a book or pamphlet of a considerable size. But the subject is highly important to all who own horses, and particularly to those, of whom there are many, who know little or nothing of their proper treatment; I will, therefore, offer a few remarks in the hope that some of your numerous correspondents who are better qualified than I am, may be tempted by my efforts to enlarge upon it. My observations will consist chiefly of directions condensed from two works published in England, under the supervision of the Society for the Diffusion of Useful Knowledge. The first is entitled "*The Horse,*" and is by far the best treatise I have ever read in regard both to the theory and practice of the veterinary art; no farmer should be without it. The second was published only last year, and is called "*Outlines of Flemish Husbandry.*" It contains many very useful directions as to the management of farm horses, the correctness of which, as well as of those in the Horse Book, none could fail to perceive, if I had room to present the reasons for them, together with the directions themselves.

To begin with the stable. This should be so constructed that its temperature during spring, summer, and fall, should be very nearly the same as that of the open air; and in winter, not more than 10 degrees above that of the external atmosphere. The size recommended as best, is (in the proportion for six horses) 40 feet long,

13 or 14 wide, and 12 feet high, if a loft is made to it, in which case there should be a plastered ceiling, to prevent the hay from being scented by the exhalations of the stalls and floor. The whole stable, especially the stalls, should be kept clean as practicable, by frequently changing the beds and strewing plaster of Paris on those spots where the urine falls. This not only prevents its offensive odor, by combining with its ammonia, but thereby forms one of the most powerful of all the new manures yet discovered. The floor of the stalls should be sloped barely enough to drain off the urine not absorbed by the litter and plaster of Paris, since a level position for the horses' feet is the most natural, and consequently best for the muscles and sinews of their legs and ankles.

Light is quite as essential to the soundness of your horses' eyes, as pure air is to the health of his body. But it should be let in through glazed windows, and open gratings, which serves also as ventilators, under the eaves of the roof. No openings should be made, either under the mangers, or opposite, or just above the horses' heads, as partial streams of air often produce colds, with all their bad consequences in horses; especially, if they are put up in such stables immediately after being much heated, and before they are rubbed dry. A glaring light, however, should always be avoided, since horses can neither rest, nor sleep, nor fatten so well in such light, as in that which is moderate.

Under the head of "*grooming*," it is recommended to treat farm horses differently from those kept for the saddle and carriage. The farm horse which is worked hard all day, and turned out at night, requires little more than to have the dust brushed off from his limbs, since the dandruff or scurf which is removed by the curry comb, is a provision of nature to defend him from the wind and the cold. But if generally stabled, then currying, brushing, and rubbing are necessary. These operations are indispensable to saddle and carriage horses; and should always be performed in the open air when the weather permits. They open the pores of the skin, aid in circulating the blood, in augmenting free, healthy, insensible perspiration, and serve instead of exercises, when that cannot be taken. Moreover, if regularly and carefully performed, with a plenty of good food in which two or three table-spoons full of brown sugar is occasionally mixed, they will secure that fine, glossy, dappled coat, to attain which, the health, and not unfrequently the life, of the horse is sacrificed, by keeping him covered up with blankets. Care should be taken in using both the curry-comb and brush, especially when new, not to apply them roughly, particularly to horses that have tender skins, and fine, thin hair. For all such, the curry-comb is hardly necessary, if they are well rubbed, and dressed with a soft brush and hair-cloth.

Horses which are constantly stabled, should be moderately exercised for two hours a day, when weather permits, if you would

keep them perfectly healthy. This, however, should depend somewhat on their age, as a young horse requires more exercise than an old one. But for neither should it be violent, when given for health, nor should the horse ever be put up until he is cool. The whip or spur should never be used for any fault but dullness or obstinacy, although it is very common to do it both for starting and stumbling, both of which are certainly aggravated by it, and thereby the rider punishes himself, in the end, much more than he does his horse. In fact, harsh, cruel treatment to horses, succeeds as badly as it does with children; and all who are so brutal and inhuman as to be guilty of it, deserve well to become its victims; neither whip nor spur would be bad remedies for *their* detestable tempers and habits.

It is common, immediately after hard working or travelling in hot weather, to wash horses all over, or to swim them in water much cooler than their skins or the atmosphere. This practice is very dangerous, often producing colds, fevers, and frequently fatal chronic complaints, unless the same exercise is speedily repeated. Even the partial application of very cold water to parts of the body, or the legs, when the horse is much heated, should be avoided; for his appearing to be gratified by it is no more a proof that it is good for him, than the manifest gratification of a sot in dram-drinking, after having been drunk, is proof that *he* is benefited thereby. The poor horse which knows no better, experiences present relief, at the expense of future suffering that he is incapable of anticipating, or brute as he is, he would probably reject it. Rubbing in the shade and leading the horse about at intervals, constitute the proper treatment both for farm and other horses, when much distressed by severe work of any kind.

But all precautions to preserve the health and vigor of your horses will prove unavailable, unless you pay equal attention to the kind and the quality of their food; the manner of feeding them, and also of giving them water.

To enable either farm or other horses to render the utmost service of which they are capable, they should be fed wholly on dry food, the grain and long forage to be old and sound, the first of which should be ground, and the latter chopped in all cases where practicable. For saddle and carriage horses under hard and constant usage, oats are better than Indian corn, and that is preferable to every other grain. The blades also, when well cured, are better than any other kind of long forage, as they contain more saccharine matter. When either farm or other horses are much heated, and great haste is indispensable, no other food should be given them than a small handfull or two of oat-meal stirred into a few quarts of soft water, with a little salt dissolved in it. Before this is given, let their nostrils, inside and out, be cleansed by a sponge or rag wet with vinegar and water, if the former can be procured, if not, with water alone. After a very hard ride or

travel in harness, the horse should be suffered to wallow, before any thing else is done to him, if time and weather permit, rather than to be led immediately into a stable to be cleaned and cooled.

Manger feeding with ground grain and chopped long forage, is now very generally preferred in England and Belgium, as well as by the best judges in our own country, to the old fashioned, most wasteful way of giving unground grain in mangers, and unchopped forage in racks. These last are disused every where, but in a few places for green grass; and in lieu of the rack, wide, deep mangers are adopted, with small iron or wooden bars fastened across them, to prevent the horses from throwing out their food. In England the most common food for farm horses consists of a mixture of bruised oats, beans, and chaff, in the proportion of eight pounds of oats, which are equal to about five quarts, (their oats being a few pounds heavier per bushel than ours,) two pounds of beans, with twenty of chaff. Thirty-five or six pounds of such food is the day's allowance for medium sized horses while at work, and forty pounds of it for large horses. Such is the common allowance during winter, when the horses are constantly stabled. But from the end of April to the end of July they are usually turned out at night, and the whole of rest days. Other kinds of food however, are much used by small farmers, such as barley, unmerchantable wheat, beans, peas, swedish turnips, carrots, and potatoes, with grasses of various kinds, but very little oats or rye. In Belgium the chief food of their farm horses consists of green clover in summer, and roots with cut straw in winter. A few oats are occasionally given, but not in so regular a manner as to give great muscular strength. They usually go to work as soon as it is light, continue at it until ten, then rest and feed until two or three o'clock, when they resume and continue their labor till six or seven. In harvest time they work from day-break until evening, resting only a few hours in the heat of the day. A pair of horses with one plough are allowed for every forty acres of arable land, the whole of which, on an average, is ploughed twice and harrowed three times; besides this they cart fodder and manure, and do the harvest work. Both in Belgium and England, they are moderately watered before and after feeding. When not worked, water is given them three times a day, and always of the softest kind, when it can be procured. In ordinary travelling also, a liberal supply of such water is strongly recommended to be given, a little at a time, which prevents excessive thirst, and the consequent drinking to excess. This is very dangerous, to a horse much heated, especially if the water be very cold.

In addition to the foregoing condensed remarks, taken chiefly from the two excellent works already mentioned, permit me now to offer such information as I have derived from others and from my own long experience as an owner of every kind of horse but

the race-horse, in regard to the best mode of managing those most useful animals, in our own country. I will "begin, (as the saying is,) at the beginning."

Colts should always be weaned before the grass is generally gone, and should be put into some enclosure where they cannot hurt themselves. Their dams should be stabled for a few days, and milked if their bags swell much. These colts should never be stabled until broke, nor much after that before they are full grown. But they should have well covered shelters, open to the south, under which to protect themselves from bad weather. Plenty of good corn fodder or hay in winter, and grass when it comes, and as long as it lasts, will keep them whilst unbroke, in a healthy, growing condition, which is far better than keeping them very fat to force their growth beyond what is natural; for overgrown horses, like overgrown men, rarely, if ever, have hardihood, vigor, and activity in proportion to their size. In fact, very large horses are objectionable, except slow and heavy drafts. The gentling of colts should commence soon after they are foaled, and continue until they are backed. Frequent handling, occasional salting or feeding them out of your hand, and stroking their necks are all good practices. From two to three years old, they should be accustomed by degrees, to the saddle and bridle; a light snaffle is best. Thus treated, the breaking becomes so easy, that they rarely play any tricks, and may be soon taught, even to stand fire, by shooting off a gun or pistol, for a few days just as they commence eating. In a word, uniformly kind, gentle treatment by their master, will always make such good, docile, gentle horses, that they will often follow him, like his dog, and will manifest equal regard for his person.

(To be continued.)

A HOLDBACK FOR OXEN.

We have often thought it a cruel practice to compel yoked oxen to hold back heavy loads, by their heads and horns, in descending hills. This practice is, however, general in all the New England States, with the exception of Connecticut, in which State there has been adopted a more humane and rational method. Each *wheel ox* is furnished with a back strap, or simple harness, which extending from the yoke, passes the rear of the ox, so that he can hold back the load without bringing his horns in contact with the yoke. We should like to see this practice adopted generally in other States. [*N. Y. Mechanic.*

HORTICULTURE.

ON THE GENERAL MANAGEMENT OF FORCING FRAMES AND FORWARDING EARLY VEGETABLES.

BY EDWARD SAYERS.

The season being now advanced for forcing early vegetables, I herewith subjoin some papers that have been written at different times, when opportunities have offered to the most advantage on the subject.

Before I enter into a general method of forcing frames, it will be proper to give some directions of size and form of frames best adapted to the purpose. Where many frames are required, the best method is to have two sizes; one for early and the other for late forcing. The size that I would recommend for early forcing will be to make a frame of three lights or sashes; the frame to be of the following dimensions, viz: the length to be the same as plank from twelve to thirteen feet back and front, the width to be five feet, the depth in front ten inches, in the back eighteen inches, which is to be sloped at the ends—which will give a good slope for the purpose; the second size for general cropping may be made of the same length, but one foot under and a little deeper at the back and front.

Compost for Forcing Frames.—It will be proper, at all times, to have a quantity of well incorporated compost for framing, which should be of such a quality as to answer most purposes; for which the best method is to procure a quantity of the top sod of a rich loamy pasture; to two cart-loads of this add one cart-load of good rotten manure, and if a quantity of leaf mould is incorporated therewith, the better; when the compost is collected, it may be formed into a regular heap and turned over two or three times during the summer, and if not wanted to be used may be often turned in the winter.

This compost will answer most vegetables, with the exception of adding some maiden-loam for melons, and a quantity of sharp river-sand for radishes and the like. It will be proper to have at hand a quantity of sand leaf-mould, maiden-loam, and the like, to mix with the other composts, that may be wanted for different purposes.

Preparing the Materials and making the Hot-bed.—Having pointed out the method of adapting the size of the frames, and compost proper for forcing frames, the next thing is the preparing and collecting the materials for the hot bed. The best material for this purpose, is a quantity of hot horse-manure from the stable, with about one-half good oak or other leaves, that have been collected in the fall, mixed therewith; however, if the leaves are not at hand, horse manure will do. Having procured the proper quantity,

it is to be thrown into a heap and well shaken together with a fork, and beaten moderately close on the outside, with the back of it—but not trod with the feet. So soon as the heat begins to ferment, which will be in a few days, it is again to be turned and well mixed in the same manner, and the same process may be followed three or four times, until the whole is in a lively state of *fermentation* and the rank *heat is passed off*, when the bed is to be made in the following manner.

The making the Hot bed.—The first consideration is to select a well sheltered situation, facing to the south, for making the bed; having selected the place, the ground is then to be measured off for the bed, a foot larger all round than the intended frame; this done, the bed is then to be made, by shaking the manure well together, and beating it down with the back of the fork—keeping the sides in a neat, compact, upright manner. The same process may be followed for all kinds of plants to be forced, and the height of the bed will depend on the season and the heat required for different plants.*

FORCING THE CUCUMBER.

Making the Seed Bed.—To obtain early cucumbers, prepare some good horse manure as before directed, to make a seed bed, preparatory to the fruit bed. A one light box or frame five feet by three, will be large enough for the purpose. Commence the bed as before directed, in a warm, dry southern aspect—on a level surface; the bed may be made from three to four feet high. The bed being made the frame is to be placed on it, facing to the south, and covered in order to draw the heat, which when it rises the inside is to be covered six inches deep with light soil, and a thermometer placed at the back of the frame to try the heat, which should be from sixty to sixty-five degrees by night, and from seventy to seventy-five degrees by day, sun heat, when the seed may be sown in the following manner.

Sowing the Seed.—Some light, rich earth should be prepared for sowing the seed, which, when sifted fine, may be put into pots nine inches in diameter. When the pots are filled with the compost, they are to be put into the frame to warm the earth, and the following day the seed may be sown, about an inch apart in the pots, and lightly covered; the pots may then be plunged in the earth nearly up to the rim, if the heat is not too powerful, but in case of a burning heat the pots may be placed on the surface of the earth. The frame will now require to be regularly attended to, by giving *air* of a morning and taking it away of an evening, and keeping the temperature as near as possible as before directed; if there is much

* In all cases the bed should be made in as mild weather as possible, and the turning the manure the same: if done in cold days it often gets chilled, and it is very difficult again to recover the heat.

steam in the bed, a little air should be left, by night, at one corner of the back of the frame, to pass it off, as too much steam is very injurious to the young plants of Cucumbers.

Potting the Plants.—When the plants are eight or ten days old they will be fit for potting off, which must be done in a fine day, about twelve o'clock; for the purpose, some light, rich earth may be prepared, and some pots the same size as before named—the pots may be about half filled with soil, when the plants may be taken carefully from the seed pots, and these plants may be carefully put into each pot, in a triangular manner, when the pots may be filled with soil to the rim.

In the operation of potting, care must be taken not to injure the plants by letting in the cold air: the potting should be performed by lifting up the sash at the back of the frame and covering the sides with bass mats.

Covering of the frames is very essential and should be regularly done at evening, a little before sun down; it should never be omitted in the early part of the season of a mild evening, which perhaps, in the middle of the night will change severely cold, and the crop will be lost. Recollect one neglect of this kind will destroy the whole crop. Uncovering should be as regularly attended to as the covering; for nothing injures plants more than to be confined in a frame when the sun is shining strongly on it. The sun must be considered the best stimulant to vegetation, and a lay a bed framer will seldom succeed. The longer plants are kept in darkness, the more feeble will be their growth.

Giving air, only requires a few hints to be perfectly understood. In the first place, it must be in all cases done gradually; that is to say, begin early in the morning by giving a little, at the back of the frame, and continue to increase as the sun grows stronger, until noon. At one or two o'clock the air may be gradually taken away till about an hour before sunset, when the frame may be closed with the exception of a little air being left at the back to let off the steam.

MANAGEMENT OF THE FRUITING FRAME.

Having a quantity of manure prepared as directed for the seed bed, proceed to make a bed for fruiting the Cucumber. The bed may be made about three feet, or three and a half feet high, and a foot all around wider than the frame intended to be put on, as directed for the seed bed. The bed being made, place the frame on it and draw the heat as before directed, letting off the rank heat at the back of it; when the bed is in a proper temperature, which can be ascertained by pressing a pointed stick into it, and drawing it up, and by pressing the point in the hand; then proceed to prepare the hills for planting.

Preparing the compost for planting.—The best compost for the cucumber is a rich mellow loam, from the top of a pasture where

cattle have been laying and enriching it. This compost should be collected in the fall, and about one third of good rotten leaf mould from a frame, or other good manure mixed therewith; the compost should be turned and mixed well together before it is used.

Preparing the hills, and planting.—In preparing the frame for planting, the top of the bed may be shaken up about three inches deep and levelled all over, when the hills are to be prepared as follows: under the centre of each sash, put enough of the above soil to form a conical hill in such a manner that the top may be eight or ten inches in diameter, and about four or six inches under the glass; when the hill is warmed through, which will be in a day after it is made, the cucumbers may then be planted, by making a hole in the centre of the top of the hill, and gently turning the plants out of the pot, with the ball entire; after which, the mould may be carefully drawn around them and moderately watered, to close the soil to the ball.

Earthing the hills.—The manager should be careful always to have some compost in the back of the frame, to keep it in an equal temperature with that in the hill. As the young roots of the plants are seen to grow through the hill, a little earth may be gradually drawn around them with the hands, at different times, until they are large, when the whole of the inside may be earthed, as the plants will then be well established.

Temperature of the bed.—The internal heat of the bed may be kept from 65 to 75 degrees of heat, and care must be taken always to leave a little air at the back of the frame, to let off the internal steam; of very cold nights a mat may be hung over the place where the air is given, to mollify the harsh air as it enters.

Stopping and thinning the vines.—The young plants may be stopped as soon as they show out one or two rough leaves, by nipping out the centre, close to the first rough leaf. The after management is, to thin the vines in such a manner that they will not be matted too close together; but can in every way enjoy the sun and air. When the fruit begins to show on the vines, the shoots are to be regularly nipped off two joints from it, in order to throw the strength and support into it.

Watering, &c.—The cucumber requires plenty of water when in a growing state, and if a quantity of soap-suds or liquid manure is often applied, the better. Every attention must be paid to giving air in a regular manner, covering well of a night, &c. Let the cultivator bear in mind, that strict attention is requisite, and that a negligent framer must never expect to succeed.

Lining the bed.—When the internal heat of the bed decreases, it should be renewed, by lining the outside of the bed with two or three feet of hot worked manure, which must be augmented at different times, to keep a continual and regular internal heat.

FORCING THE MELON.

The melon requires nearly the same treatment as the cucumber, in the preparing of the bed, the management of the seed bed, and the potting of the young plants. The time of sowing the seed may be nearly the same as the cucumber, although it is generally the practice to sow a week or two later.

Fruiting frame.—The fruiting bed for the melon may be prepared in the same way as for the cucumber, except that the cucumber requires more bottom heat than the melon, the melon being liable to have its roots burnt by too much heat. Having the bed in proper order for planting, a hill may be prepared under the centre of each light, as directed for the cucumber. The compost may be nearly the same, only more loamy. The plants being placed in the hills, the frame should be regularly aired every fine day, and covered every night a little before sunset, and uncovered in the morning as soon as the sun shines full on it; every attention should be paid to the welfare of the plants as recommended for the cucumber. The compost for the earthing of the bed, should be a strong mellow loam, with a portion of well rotted hot-bed manure mixed with it. The melon does not require so rich a soil as the cucumber, nor so much watering. Having the compost prepared, the bed should be earthed in every way as recommended for the cucumber, in a gradual manner.

Stopping young plants.—This ought to be done when the first rough leaf is fully grown, by nipping out the leader in the centre of the plant, and again, when the plants have made a growth of eight or ten joints in length. This last stopping will be the means of throwing the plants into fruit at once.

Watering the plants.—The melon requires less water than the cucumber; and in many cases, when over watered, the vines canker and rot off, especially if the hills are dished so that the water collects about them. The hill of the melon should be always a little above the level of the soil in the frame, to let off the surface water about it. Water, at the roots, on a mild evening, as often as once a week; when the frame should be closed and well covered, in order that the vines and inside may not be chilled. After very hot days, the vines may be sprinkled over with a water-pot with a rose on the spout, of an evening, about an hour before sundown, and closed and well covered. In this state, the frame will bo steamed inside, which will keep down the red spider, and be congenial to the growth of the vines.

Thinning the vines.—Thinning the vines must be regularly attended to; that at no time throughout the season of their growth they should be allowed to become crowded or matted together. Every part of the frame should be filled with vines in a regular manner. Of the two extremes, I should advise the cultivator to keep the vines rather too thin than too thick, for by crowding the

frame with either too many vines or fruit, the crop will be materially injured.

Stopping the vines for fruiting.—When the fruit of the first flowers are swelling as big as marbles, the shoots may be nipped off one joint from the best formed fruit, in order to throw the strength into it, and make it swell freely.

Thinning the fruit.—When the fruit is set freely all over the frame, it may undergo a regular thinning, by selecting that which is the best formed and of a healthy appearance to remain; and taking off any deformed fruit, and a portion where it is too thick; this thinning will throw vigor into the vines and cause the fruit left on to swell and form in a handsome manner.

Ripening the fruit.—When the fruit is beginning to color, the watering must then be suspended; as too much water spoils the flavor of the fruit. Plenty of air must also be given at every opportunity, when the fruit is ripening.

FORCING RADISHES AND POTATOES.

A moderate hot-bed may be prepared at any time after the first of March for forcing radishes and potatoes. The manner of making the bed and materials is the same as that recommended for cucumbers, with this exception, namely—that if possible, nearly all leaves are the best to be used to give *heat*, and the bed should not be so high, as the heat required will not be over 50 degrees.

Having the *bed* made place on the frame as before directed to draw the heat. When the heat has risen, cover the whole of the inside of the frame with light rich earth about eight inches thick, and close the frame again to draw up the heat; when the heat begins to rise the seed may then be sown regularly over the bed, and some fine earth sifted over it and gently beaten down with the back of spade or shovel. Care must be taken in this stage of forcing that the frame is not kept too much confined, but plenty of air admitted in the day, and some left on at night to let off the steam that will arise: the temperature should be kept from 45 to 50 degrees, and never over; when the radishes begin to appear, which will be in a few days, every attention should be paid to give them plenty of *light* and *air* or they will be drawn in a weak and sickly state which they will never fully recover—care must be taken to let off the steam at the back of the frame, particularly when the *sun* shines on it; *but this must be done in a cautious manner when it is freezing severely, or, in many cases, the cold air let in being too powerful for the internal, freezes the young plants, and the sun acting on them scalds them in a manner that they never can recover.* This remark I hope will serve through the whole process spoken of in forcing frames. The temperature may be regularly kept through the process of a moderate degree of 50 to 56. Every precaution must be taken to give plenty of air of a fine day and cover well at night. When the young plants are coming into rough leaf, they are to

be then thinned to a regular distance of two or three inches apart. The bed may now be regularly watered of a warm morning about sunrise if not frosty, and the frame may be closed an hour or two but not too long to scald the leaves of the plants: this process may be continued, and if the heat of the bed is declining a fresh lining may be applied. Recollect the bottom heat should increase with the season, and not decrease as is often the case.

FORCING THE POTATO.

For forcing the potato a bed may be in every manner prepared as for that of the radish, with the exception that six inches of soil will be sufficient at the first commencement: having the bed prepared, the potatoes may be planted in rows about a foot apart and eight inches in the rows, the planting may be performed by pressing the potatoes on the surface of the soil, when the earth is warmed through three inches, more may be covered over the potatoes; and after the plants come up some inches, six inches may be given as a final earthing.

During the process of forcing, plenty of air may be given of a fine day and every precaution taken to cover well of a night to keep out the frost, which, if allowed to freeze the tops, will greatly retard their growth.

FORWARDING CABBAGE—CAULIFLOWERS—LETTUCE.

In order to forward cabbage, lettuce, cauliflowers and other esculent vegetables, a moderate hot-bed may be made about the beginning of March and covered with about six inches of good soil, and in every way managed as for the radish and potato.

When the bed is in order, the seed of the different kinds of plants required to be grown may be sown in drills three inches apart and lightly covered with leaf-mould—when the plants are come up and the rough leaf appears they may be thinned to a regular distance and moderately watered of a warm morning. In order to have the plants strong and vigorous for replanting in the garden they may be transplanted out into a second frame two or three inches apart each way.

In the process of growing the plants every care must be taken to give plenty of air of a fine day, and covering the frame of a night, that the frost may not retard their growth.

TOMATO—EGG PLANT—PEPPER.

The above kinds of vegetables may be forwarded in precisely the same manner as the latter—with the exception that more heat will be required and less air given. The heat given for the cucumber will answer, and if manure and frames are not to be had at the early part of the season; the seeds of the different kinds may be sown in large pots and placed at the back of the cucumber frame

until the middle of March, when they are to be transplanted out into a bed with a little bottom heat in the same manner as recommended for the cabbage and lettuce. The egg plants must be planted four or five inches apart in order to give them room to grow to large plants before putting them out in the natural ground.

HARDENING OF PLANTS FOR PLANTING OUT IN OPEN GROUND.

Before closing the subject of framing, I must give some few remarks on hardening plants for planting in the open ground. There is nothing that is more simply done than forwarding the vegetables spoken of, and few things generally worse managed.

In the manner of framing the plants are generally at first mismanaged by growing them too slender, owing to keeping the frame too much confined, and consequently they are by the heat and steam drawn weak and succulent. The next common error is that so soon as a change of warm weather or days appear, the sashes are altogether taken off in the day, and in many cases are left off at night, and often the consequence is that the plants are frosted and retarded in their growth. The plants should be gradually hardened off as the warm weather increases.

FORCING OR FORWARDING VEGETABLES IN TIN CANISTERS.

The credit of this novel mode of forcing or forwarding vegetables is due to a French gentleman, some years since a superintendent to the late Doctor Hosack, of Hyde Park, N. Y., who practised it very successfully at that place. The method is so simple that any intelligent person may practice it with every facility, when once acquainted with the process.

The canisters are simply made of a piece of tin forming a tube of different dimensions, from eight inches to a foot in length. The width on the top is from three inches to six; on the bottom from four to eight. These different sizes must be used according to the vegetable to be cultivated.

Having the canisters prepared, the bed may then be made in the usual manner, of a heat corresponding with the nature of the plants to be forced. The bed being made, place on it the frame and level the manure; draw the heat, &c., as before directed. When the bed is in proper order to receive the earth for planting, then place the tin canisters into it, the largest end downwards; when the frame is filled with the canisters, fill them with soil, and the places between them, so that the whole is level with soil, to the top of them. This done, close the frame to draw the heat, after which, seeds of the different kinds of plants required, may be sown in the centre of the top of each canister, to form hills or the like for transplanting. The management of the frame must be in every way corresponding to the nature of the plants; and they must be

managed in a manner to harden them previous to their being transplanted into the ground, as before directed.

Transplanting the plants from the Frames.—The operation of transplanting must be very carefully done, as the plants will be much injured if the roots are broken by removing them. The method I have generally adopted, is, first to take away the frame, then clear away the soil from the first row of canisters; this done, take up the canisters carefully, by placing a sharp spade under the bottom, cutting it from the soil, and carefully placing it with the ball entire in a wheelbarrow. Having the ground well prepared, the planting is performed by preparing a hole the depth of the canister, which is placed therein and the earth placed about it in a neat compact manner: the canister is then gently slipped up, without disturbing the roots, and the plants watered, in order to close the loose soil about it.

This system is particularly adapted to Indian corn. I hope to see the time when this method will prove of advantage to the forcing of early vegetables; but I am of opinion that it will be much improved by making moulds of pot earth of the same consistence as for flower pots, of the same dimensions recommended; and I give a word of advice, for potters to commence on a small scale.

[*Horticultural Register.*

FLORICULTURE.

CULTURE OF THE CARNATION.

The carnation is propagated by seeds, by layers, or by slips termed pipings, to each of which we shall now advert.

SEED SOWING AND SEEDLINGS.

The seeds may be sown in the open border, if the soil be light and fine, in spring, at the time of sowiug hardy annuals, but it is better to sow them in pans or boxes as recommended for the auricula and polyanthus.

The best soil for this purpose is a compost of equal parts of fresh soil from an old pasture, and horse or cow dung two years rotted, with one fifth of course pit or river sand, the whole well incorporated and frequently turned over to the sun and air for several months before it is used.

About the middle of March, the seeds should be sown evenly on a surface previously made even, and finely-sifted mould laid over them to the depth of a quarter of an inch. The pans may be placed in a moderate hot-bed just to cause the seeds to germinate, but they had better not be kept long there, for fear of weakening and drawing the plants.

Without artificial heat, the seed may be sown during the first two weeks of May, placing the pans or boxes in an open airy part of the garden, but shaded from the sun, at least from ten in the morning till four in the afternoon. Moderate moisture will be indispensable; but if the soil be kept too wet, the plants are liable to damp off, or to be otherwise injured.

AFTER CULTURE OF SEEDLINGS.

When the plants are come up they should be kept clear from weeds, and be watered occasionally till they acquire six leaves, and reach about two inches high. This will be about July, when, if the weather be moist, they ought to be taken up and pricked out in rows six inches apart, taking care to water them well till they catch fresh root.

About the beginning of September, they will have attained a large growth, and must be removed to other beds, or be potted for flowering the following summer.

If planted in beds, these should be prepared with similar compost to that directed for the seeds, and set in rows eight to twelve inches apart.

Here they should be protected in severe weather during the winter by hooping the beds over and covering them with mats.

In other respects, the beds only require to be kept free from weeds, occasionally stirring the earth between them with a hoe, and as the flower stems advance, supporting them with sticks.

As soon as the blossom can be seen, all the single sorts should be taken up and thrown away to give the double ones more room to grow. The finer blossoms ought then to be selected for laying or piping, as we shall presently direct.

LAYING.

Laying is in a manner indispensable for continuing sorts, and hence when a plant sends up only one stem without any side shoot for laying, if it be suffered to blow, it usually dies. If this happen to valuable sorts, therefore, the flower bud should be nipt off to cause the plant to branch.—*(Complete Florist, p.* 101.*)*

Hogg says that common gardeners are "great bunglers in laying. There is not one in ten whose assistance I would claim on the most pressing occasion, and leave the operation uncontrolled and unlooked after; whereas I could trust implicitly to an amateur cobbler, tailor, weaver, or barber, who had the least practice with their own flowers."

Time.—The best time, says Maddock, to lay carnations, is when the plants are in full bloom, which generally happens about the middle or towards the end of July, or beginning of August, according as the season is more or less forward.

Florists who are particularly desirous of preserving the bloom in the greatest perfection, defer laying till the flowers decline, the

blooms being considerably impaired by the wounds inflicted in the operation, particularly when it is performed at an early period of blooming. The advantage of early laying is to obtain strongly rooted plants before the winter sets in; Mr. Hogg says, from the 21st of July till the 21st of August is the best.

Pegs.---The pegs for laying may be of wood, bone, or, what is better, fern, each five or six inches long, formed somewhat like the figure 7, with a short hook at the top.

Fern pegs, which in most places are very easy to procure in abundance, are to be preferred, because they are naturally formed in the stalk of the plant, and only require to be of suitable lengths. They retain a sufficient degree of strength to hold the layers securely down till they have formed root, and will decay when no longer needful.

The Operation.---The plants ought to be abundantly watered the day before laying. When old plants are in pots, as is most commonly the case, the pot should be placed on a table or stool, to give greater facility of examining and dressing the plants. When seedling or other plants are in the open ground, the operator has not the same advantages.

When plants produce too many side shoots, if the sort be valuable, it will be better to take only three or four for layers, reserving the rest for pipings, because many layers draw so much nourishment from the root as to injure the vigour of the layers.

Supposing the layer selected to have four or five joints, the lower leaves next the root must all be cut off, or stripped close to the stem, till within two or three joints of the end or extremity of the layer.

Maddock, and other florists, advise all the extremities of the leaves to be cut off with a knife or pair of scissors so as to leave them only an inch and a half or two inches in length, from the joint whence they proceed, according to the strength and substance of the layer: but it might be questioned perhaps whether it would not tend to strengthen the new plant about to be formed were the ends of the leaves left entire.

All the layers on one plant must be thus dressed or prepared before proceeding farther; and when all the layers are ready, the bits of leaves must be cleared away from the surface of the soil, which ought to be stirred about an inch in depth, and fresh mould, light and rich, but not too fine in the grain, added, to the depth of an inch or two. Maddock says, the old carnation compost used last year will answer for this purpose extremely well, and ought to be reserved for the occasion.

The operator must next take a very sharp, smooth edged penknife, with a small thin blade, holding the layer between the thumb and fingers of the left hand a little bent upwards, and introduce the knife on that side of the layer next the ground in a sloping direction upwards, commencing about a quarter of an inch below the

second or third joint from the extremity, and continuing to cut through the middle of that joint, and one half or three quarters of an inch above it. The small portion left under and connected with the joint, is to be cut off horizontally, quite close to the bottom of the joint but not into it, because it is from the outer circle of the bottom of the joint that the fibres proceed, and consequently, this part must not be injured. It is requisite, however, to cut it off close to the joint; because, if suffered to remain, it would decay, and perhaps infect with putridity the joint itself, and kill the plant.

The slip or tongue thus recommended to be made, is for the purpose of interrupting the downward flow of the pulp, so as to cause it to form root fibres; while the upward flow of the sap in the more central parts not being interrupted, the layered shoot continues to grow as if it had not been so treated.

When the incision has been made with the knife, the layer ought to be pressed into the soil, firmly but gently, so as to avoid breaking it off or cracking it at the joints, for this would both interrupt the due supply of sap from the mother plant, indispensable to successful rootings, and also render it liable to canker and rot.

The layer must be secured in the position it has been pressed into, by one of the pegs forced into the soil close behind the joint where the incision was made, and not less than half an inch, nor more than an inch below the surface of the soil. The fibres indeed are soonest formed, when the joint from which they proceed is only just covered with earth. If buried deep, it will be too far from the influence of the air and of the sun's heat, will be more liable to decay, and will take a longer time to root.

The remainder of the stalk of the layer should lie as much as possible upon or above the surface of the soil; but must not, on any account, be covered deep with earth, for this would cause it to decay before it had furnished the layer with sufficient nourishment to cause it to root.

The extreme point of the layer may be raised to as upright a position as can conveniently be effected, though it is not necessary at first that it should have an exactly erect position, for it will naturally soon acquire this in its progress of growth. It should not, even at first, however, be so nearly horizontal as not to allow the cut part to open sufficiently for the fibres to issue forth regularly on every side.

It is important that the layers when pressed down should be in a dry state, for when moist and full of sap they are so brittle, that they are liable to break off. As soon, therefore, as the layers are dressed and ready to be pegged down, the plant should be placed in the sunshine for about half an hour, in order to render the layers somewhat flaccid and pliable.

After laying, it is necessary to give the plants a good watering, and to shade them, from the two powerful influence of the mid-day sun, till the layers are well rooted.

The layers will in general be rooted in about three weeks, and be ready for removal in six or eight weeks.

AFTER MANAGEMENT OF LAYERS.

When the layers have struck good roots, they may be cut off from the mother plants, with about an inch of the stalk below the incision attached to them, and with the root fibres as entire as possible. The sticky parts about the bottom and the top leaves must then be trimmed off, and the young plants planted out either in beds or in pots. The author of the Complete Florist says, it is best to defer separating the layers till March. If planted in beds, they may be placed at six or eight inches' distance with a dibber, and have a good watering every two days till they take fresh root, which will be in ten days or a fortnight.

From these beds they should be removed with balls of earth about their roots, and potted in small pots, and treated as will be directed for full grown plants.

If the layers, on removal from the mother plants, are to be potted, this may be done in pots No. 48, filled with good loam and leaf-mould in equal portions. A single plant, if of good size, may be planted in each pot; but when the plants are small, two or even three may be planted in one pot around the sides.

The pots must be set on tiles, slates, or boards, to prevent the intrusion of worms, till the middle or end of October, when winter protection will be necessary.

OLD PLANTS LAYERED FROM.

The plants from which layers are taken, seldom survive, unless very strong and sound, or some of the young upper shoots be left, as may often be the case when these are too short to be conveniently laid. These left shoots will of course continue the growth of the plant, by promoting the absorption of sap from the soil.

Such of the old plants as appear likely to live after the layers are taken off, may remain in their pots, which should be placed in the warmest situation in the garden, plunged into the ground up to their rims. They must be defended from heavy rains and severe frosts during winter, by hoops and mats. They will require, like other plants, to be fresh potted in spring.

[*Flower Garden.*

THE ORCHARD.

OF PRUNING.

THE quantity of timber that a tree forms, the amount and quality of its secretions, the brilliancy of its colors, the size of its flowers, and, in short, its whole beauty depend upon the action of its branches and leaves, and their healthiness. The object of the pruner is to diminish the number of leaves and branches; whence

it may be at once understood how delicate are the operations he has to practice, and how thorough a knowledge he ought to possess of all the laws which regulate the action of the organs of vegetation. If well directed, pruning is one of the most useful, and, if ill directed, it is among the most mischievous, operations that can take place upon a plant.

When a portion of a healthy plant is cut off, all that sap which would have been expended in supporting the part removed is directed into the parts which remain, and more especially into those in the immediate vicinity of it. Thus, if the leading bud of a growing branch is stopped, the lateral buds, which would otherwise have been dormant, are made to sprout forth; and, if a growing branch is shortened, then the very lowest buds, which seldom push, are brought into action: hence the necessity, in pruning, of cutting a useless branch clean out; otherwise the removal of one branch is only the cause of the production of a great many others. This effect of stopping does not always take place immediately; sometimes its first effect is to cause an accumulation of sap in a branch, which directs itself to the remaining buds, and organizes them against a future year. In ordinary cases, it is thus that spurs or short bearing-branches are obtained in great abundance. The growers of the filbert, in Kent, procure in this way greater quantities of bearing wood than nature unassisted would produce, for, as the filbert is always borne by the wood of a previous year, it is desirable that every bush should have as much of that wood as can be obtained, for which every thing else may be sacrificed; and such wood is readily secured by observing a continual system of shortening a young branch by two-thirds, the effect of which is to call all its lower buds into growth the succeeding year; and thus each shoot of bearing wood is compelled to produce many others. The peach, by a somewhat similar system, has been made to bear fruit in unfavorable climates (*Hort. Trans.*, ii. 366); and every gardener knows how universally it is applied to the pear, apple, plum, and similar trees.* Even the fig-tree has thus been rendered much more fruitful than by any other method. "Whenever," says Mr. Knight, "a branch of this tree appears to be extending with too much luxuriance, its point, at the tenth or twelvth leaf, is pressed between the finger and thumb, without letting the nails come in contact with the bark, till the soft

* [Nothing is more general, of late years, than the complaints of the short period of productiveness in the peach tree, throughout the middle states. Although this is often owing to the worm, which girdles the tree at the root, yet the almost total neglect of *pruning* is a frequent cause of sterility and decay. When left to itself the interior of the head of the tree becomes filled with small dead branches, and the trunk and larger limbs bark bound and moss covered; the whole tree is enfeebled; leaves are only produced at the extremity of the long branches, and the fruit borne, if any, is comparatively worthless. By pursuing the practice recommended in the text, the trees may be preserved for a long time in a high state of vigor and productiveness. A. J. D.]

succulent substance is felt to yield to the pressure. Such branch, in consequence, ceases subsequently to elongate; and the sap is repulsed, to be expended where it is more wanted. A fruit ripens at the base of each leaf, and during the period in which the fruit is ripening, one or more of the lateral buds shoots, and is subsequently subjected to the same treatment, with the same result. When I have suffered such shoots to extend freely to their natural length, I have found that a small part of them only became productive, either in the same or the ensuing season, though I have seen that their buds obviously contained blossoms. I made several experiments to obtain fruit in the following spring from other parts of such branches, which were not successful: but I ultimately found that bending these branches, as far as could be done without danger of breaking them, rendered them extremely fruitful; and, in the present spring, thirteen figs ripened perfectly upon a branch of this kind within the space of ten inches. In training, the ends of all the shoots have been made, as far as practicable, to point downwards." (*Hort. Trans.*, iv. 201.)

The effect produced upon one part by the abstraction of some other part, thus shown in the developement of buds which would otherwise be dormant, is seen in many other ways. If all the fruit of a plant is abstracted one year when just forming, the fruit will be finer and more abundant the succeeding year, as happens when late frosts destroy our crops.* If of many flowers one only is left, that one, fed by the sap intended for the others, becomes so much finer. If the late figs, which never ripen, are abstracted, the early figs the next year are more numerous and larger. If of two unequal branches, the stronger is shortened and stopped in its growth, the other becomes stronger; and this is one of the most useful facts connected with pruning, because it enables a skilful cultivator to equalize the rate of growth of all parts of a tree; and, as has been already stated, this is of the greatest consequence in the operation of budding. In fact, the utility of the practice, so common in the management of fruit trees when very young, turns entirely upon this. A seedling tree has a hundred buds to support, and consequently the stem grows slowly, and the plant becomes bushy beaded: but, being cut down so as to leave only

* [The apple trees, in this country, very commonly bear enormous crops every other year; and the orchardist finds himself nearly destitute of fruit one season, while his trees on the following year are nearly broken down beneath their load. The excessive fecundity of one season so exhausts the tree that it requires another whole season for recovery. A certain and uniform crop may be obtained *every year*, by thinning out one-half or two-thirds of the apples when they have attained about one-fourth of their usual size. The remainder will grow to greater perfection than if all were left; while the tree having produced only a moderate crop, will bear again the succeeding year. When this practice has been pursued for some years with trees that have just fairly commenced bearing, it often happens that they will afterwards produce moderate annual crops if left to themselves. A. J. D.]

two or three buds, they spring upwards with great vigor, and, being reduced eventually to one, as happens practically, that one receives all the sap, which would otherwise be diverted into a hundred buds, and thrives accordingly, the bushy head being no longer found, but a clean strait stem instead. In the oak and the Spanish chesnut this is particularly conspicous.

Nothing is to be more strictly guarded against than the disposition to *bleed*, which occurs in some plants when pruned, and to such an extent as to threaten them with death. In the vine, in milky plants, and in most climbers or twiners, this is particularly conspicuous; and it is not unfrequently observed in fruit trees with gummy or mucilaginous secretions, such as the plum, the peach, and other stone fruits. This property usually arises from the larger size of the vessels through which sap is propelled at the periods of early growths, which vessels are unable, when cut through, to collapse sufficiently to close their own apertures, when they necessarily pour forth their fluid contents as long as the roots continue to absorb them from the soil. If this is allowed to continue, the system becomes so exhausted as to be unable to recover from the shock, and the plant will either become very unhealthy, or will die.* The only mode of avoiding it is to take care never to wound such trees at the time when their sap first begins to flow; after a time, the demand upon the system by the leaves becomes so great that there is no surplus, and therefore bleeding does not take place when a wound is inflicted.†

All these things show how extremely necessary it is to perform the operations of pruning with care and discretion. But in addition to the general facts already mentioned, there are others of a more special kind that require attention. The first thing to be thought of is the peculiar nature of the plant under operation, and the manner in which its special habits may render a special mode of pruning necessary. For example, the fruit of the fig and walnut is borne by the wood of the same season; that of the vine and filbert by that of the second season; and pears, apples, &c., by wood of some years' growth; it is clear that plants of these three kinds will each require a distinct plan of pruning for fruit.

---

* [A solution of gum shellac in alcohol, of the consistence of thin paste (put on with a brush,) is an admirable application to wounds of stone-fruit trees, and others, which are disposed to bleed profusely. It is readily applied, adheres closely, excludes the air completely, and is less offensive to the eye than large plasters of clay, composition, &c. A. J. D.]

† The vine often bleeds excessively when pruned in an improper season, or when accidentally wounded; and, I believe, no mode of stopping the flow of the sap is at present known to gardeners. I therefore mention the following, which I discovered many years ago, and have always practised with success:—If to four parts of scraped cheese be added one part of calcined oyster shells, or other pure calcareous earth, and this composition be pressed strongly into the pores of the wood, the sap will instantly cease to flow; so that the largest branch may, of course, be taken off at any season with safety. (*Knight, in Hort. Trans.* i. 102.)

The pruner has frequently no other object in view than that of thinning the branches so as to allow the free access of light and air to the fruit; and if this purpose is wisely followed, by merely removing superfluous foliage, the end attained is highly useful; it is clear, however, that in order to arrive at this end, without committing injury to the tree which is operated on, it is indispensable that its exact mode of bearing fruit should be in the first instance clearly ascertained.

The period of ripening fruit is sometimes changed by skilful pruning, as in the case of the raspberry, which may be made to bear a second crop of fruit in the autumn, after the first crop has been gathered. In order to effect this, the strongest canes, which in the ordinary course of things would bear a quantity of fruiting twigs, are cut down to within two or three eyes of the base; the laterals thus produced, being impelled into rapid growth by an exuberance of sap, are unable to form their fruit buds so early as those twigs in which excessive growth is not thus produced; and, consequently, while the latter fruit at one season, the others cannot reach a bearing state till some weeks later. Autumnal crops of summer roses, and of strawberries, have been sometimes procured by the destruction of the usual crop at a very early period of the season; the sap intended to nourish the flower buds destroyed is, after their removal, expended in forming new flower buds, which make their appearance at a later part of the year.

The season for pruning is usually midwinter, or at midsummer; the latter, for the purpose of removing new superfluous branches, the former for thinning and arranging the several parts of a tree. It is, however, the practice, occasionally, to perform what is called the winter pruning early in the autumn, as in the case of the gooseberry, and of the vine when weak; and the effect is found to be, that the shoots of such plants, in the succeeding season, are stronger than they would have been had the pruning been performed at a much later season. This is necessarily so, as a little reflection will show. * * * *

With regard to pruning plants when transplanted, there can be no doubt that it is frequently more injurious than benefical. It is supposed, or seems to be, that when the branches of a transplanted tree are headed back, the remaining buds will break with more force than if the pruning had not been performed. * *
Its roots are not fully in action, but from the injuries sustained in removing they are capable of exercising but little influence on the branches. The great point to attain, in the first instance, is the renovation of the roots, and that will happen only in proportion to the healthy action of the leaves and buds: if, therefore, the branches of a plant are removed by the pruning knife, a great obstacle is opposed to this renovation; but, if they remain, new roots will be formed in proportion to their healthy action. The danger to be feared is, that the perspiration of the leaves may be so great

as to exhaust the system of its fluid contents faster than the roots can restore them, and in careless transplanting this may doubtless happen: in such cases it is certainly requisite that some part of the branches should be pruned away; but no more should be taken off than the exigency of the case obviously requires; and, if the operation of transplanting has been well performed, there will be no necessity whatever. In the case of the transplanting of large trees, it is alleged that branches must be removed, in order to reduce the head, so that it may not be acted upon by the wind; but in general it is easy to prevent this action by artificial means.

(To be continued.)

MISCELLANEOUS.

OBTAINING CREAM FROM MILK.

A process of divesting milk of its component portion of cream, to an extent hitherto unattainable, has been effected by Mr. George Carter of Nottingham Lodge, and is thus detailed by that gentleman, in a paper presented to the Society of Arts:—"A peculiar process of extracting cream from milk, by which a peculiar richness is produced in the cream, has long been known and practised in Devonshire; this produce of the dairies of that country being well known to every one by the name of "clotted," or "clouted cream." As there is no peculiarity in the milk from which this fluid is extracted, it has been frequently a matter of surprise, that the process has not been adopted in other parts of the country. A four sided vessel is formed of zinc plates, twelve inches long, eight inches wide, and six inches deep, with a false bottom at one half the depth. The only communication with the lower compartment is by the lip, through which it may be filled or emptied. Having first placed at the bottom of the upper compartment, a plate of perforated zinc, the area of which is equal to that of the false bottom, a gallon (or any given quantity) of milk, is poured immediately when drawn from the cow, into it, and must remain there, at rest, for twelve hours; an equal quantity of boiling water must then be poured into the lower compartment through the lip; it is then permitted to stand twelve hours more, (i. e., twenty-four hours altogether,) when the cream will be found perfect, and of such consistence that the whole may be lifted off by the finger and thumb. It is, however, more effectually removed, by gently raising the plate of perforated zinc from the bottom, by the ringed handles, by which means the whole of the cream is lifted off in a sheet, without remixing any of it with the milk below. With this apparatus I have instituted a series of experiments; and as a

mean of twelve successive ones, I obtained the following results —four gallons of milk treated as above, produced in twenty-four hours, four and a half pints of clotted cream, which, after churning only fifteen minutes, gave forty ounces of butter—four gallons of milk treated in the common mode, in earthenware pans, and standing forty-eight hours, produced four pints of cream, which after churning ninety minutes, gave thirty-six ounces of butter. The increase in the quantity of cream, therefore, is twelve and a half per cent. The experimental farmer will instantly perceive the advantages accruing from its adoption, and probably his attention to the subject may produce greater results. I shall feel richly rewarded if, by exciting an interest on the subject, I can produce any, the slightest improvement in the quantity or mode of producing an article, which may properly be deemed one of the necessaries of life." [*Family Magazine.*

TIME OF TAKING UP BEES.

MOST persons who keep bees neglect to take them up in season. This business is not generally done till September about two months after the bees have ceased to collect as much honey as they eat.

We have found by weighing hives that they usually grew lighter after the middle of July. In favorable seasons for protracting the time of collecting honey, when the vegetation is late and the weather warm and wet, bees may gain till the last of July. But if the season be forward and there be a drought the first of July, bees will then have the largest quantity of honey that they will have for the season, unless they can procure it from buckwheat.

When they cannot collect honey in the latter part of the summer and first of the fall, they will eat more as they are thus active, than they will consume during the same length of time in winter while they are still. Bees frequently eat as much honey from the time the honey season is over till they are taken up in the fall, as they eat in three months in cold weather.

Any one who doubts the correctness of these remarks can satisfy himself by experiments in weighing his bees weekly. We have practised this way, and these remarks are the result of our observations.

At present there is none, or but very little honey in this market, though the bees have been consuming their stores a month; in some sections where it was dry in July, more than a month. When they have eaten one fourth, one third, and in some cases one half their honey the balance will be taken. We hope that this subject will receive more attention, then the keeping of bees will be more profitable.

SOAKING CORN TO FEED HORSES.

A gentleman, who resides in Baltimore county, and who is one of the most successful farmers in our vicinity, informed us a few days since, that he saved at least one third of his corn by the manner in which he fed it out to his horses. He has two hogsheads placed in his cellar, where they are secure from freezing. These he first fills with corn in the ear, then pours in a sufficient quantity of water to cover the corn. After the ears have been thoroughly soaked, he commences feeding, gives to his horses *two thirds* the usual quantity allowed. As one of these hogsheads becomes empty, he refills it; and by the time the other is empty the one last filled is sufficiently soaked for use. In this way the cobs become so softened that the horses consume the whole of them, and they are thus made to add fully one-third more to his stock of feed. He answers us, that his horses eat the cobs with avidity, keep in good order, and are competent to perform plantation labor as when they consumed the grain alone. The success of our informant should stimulate his agricultural brethren to follow his example, as the labor of preparation is nothing, compared with the great saving effected. [*Baltimore Farmer.*

CHOKING.—IMPORTANT TO FARMERS.

The following method of relieving neat cattle when choked by a turnip or potato, has been tried, and found successful in every instance. Pour into the throat of the animal, from a junk bottle, a pint or so of lamp or any kind of oil, at the same time rubbing the throat briskly with the hand. Immediate relief will follow.

WEEDING.

By early attention to weeding, a great deal of labor is saved, beside the advantage to the growing crop from keeping the soil light and loose. When the weeds get a good start, it will be far more work to destroy them than to stir the earth as they are starting, and thus keeping them in subjection. When the weeds are very small, the earth at the surface may be easily dug over with a hoe, or stirred with a harrow or cultivator, and the weeds seem to be no impediment; but when they are large, the work becomes slow and laborious, and it is with difficulty that the weeds are eradicated or destroyed in any way.

HOW TO KEEP A VILLAGE COW.

Transplant sugar beets 15 inches apart, like cabbages, but with more care, in every spot or space you can spare in your lot or garden. If the land is worked well and early, they will tend themselves after two or three light hoeings, and grow large enough to make a mess each, with the addition of a quart of shorts seasoned with ground oil cake. Here is sugar, gluten, starch, and oleaginous matter to boot. With such slops a cow needs nothing but a little straw. S. W.

RATS.

A writer in the N. E. Farmer has effectually prevented rats from gnawing holes in the wood work of his house, by pouring upon places where they were at work, a strong decoction of Tobacco. They will not eat wood saturated with Tobacco. Many will honor their taste.

TO CORRECT DAMAGED GRAIN.

MUSTY grain, totally unfit for use, and which can scarcely be ground, may, it is said, be rendered perfectly sweet and sound by immersing it in boiling water, and letting it remain till the water becomes cold. The quantity of water must be double that of the grain to be purified. The musty quality rarely penetrates through the husk or bran of the wheat. In the hot water, all the decayed or rotted grain swims upon the surface, so that the remaining wheat is effectually cleansed from all impurities, without any material loss. It is afterwards to be dried, stirring occasionally on the kiln. [*New Eng. Farmer.*

CABBAGE WORMS.

A writer in the Southern Cultivator says, "he had a square of very fine cabbages in his garden, upon which the worms had commenced making great ravages. Pennyroyal was gathered and scattered over the cabbage-heads plentifully, and the work of destruction ceased." The writer did not know whether the discovery was a new one, but it seems to have been a very easy and effectual one, and well worth a trial. [*Alb. Cult.*

SALT may be safely mixed with food given to geese or goslings, but is fatal to turkeys or chickens. A friend of ours lost fifty chickens by their eating a mixture of salt and meal intended for his horse. [*Ibid.*

STARTLING FACT.

THE sum annually expended for bread by the population of Great Britain and Ireland, amounts to twenty five millions sterling; while the money expended in the United Kingdom in strong drink amounts to fifty millions annually! The consumption of gin alone, in these countries, amounts to more than twelve millions sterling every year.

BOTS IN HORSES.

APPLY spirits of turpentine to the hollow of the breast, warm it in with a hot shovel, it will route them immediately.

For Cholic, put into a bottle 3 gills of spirits, say whiskey; 1 spoonful gunpowder; 1 spoonful cayenne pepper, or 2 of black—add if convenient a wild turnip grated; turn it down and move it lively. If it is an obstinate case, repeat the dose, and he is well in either wind, bloat, or gripe cholic in short metre.

DISCOVERIES IN HINDOSTAN.

The efforts making by the government to improve and render available the natural resources of India, are most praiseworthy. Especial instructions are given to officers, civil and military, to search after the mineral riches of their several districts; and the results, as to coal and iron, have been most satisfactory. The latest has been one of the most important, the veins of both the above named minerals being close to the surface—apparently of inexhaustible extent, and on the banks of the Dumooda, a river entering the Ganges just below Calcutta. In the attempt to raise cotton of a quality that will compete with Georgia and Sea-island, good progress is making, the American planters having got to work, and reporting favorably. One of the most curious discoveries relative to this, is of a soil so perfectly identified with the Sea-island soil, not only on analysis, but to the most unpractised eye in appearance, as to be most extraordinarily striking. This soil has been found at Obedooba, an Island in the Bay of Bengal. It is a curious fact, that intense as is the heat of this climate, the attempt to make brine profitably, for the purpose of manufacturing sea-salt, by exposing sea-water upon sun-pans, as is practised in Hampshire, has been a total failure, after a vast outlay and three years trial. The native system beats them hollow; the latter dig up a space of ground roughly, and continue to sprinkle it with sea-water, until the clods, when dry, are concrete masses of earth and salt; these are put into a vat, and river-water allowed to percolate through, until, by frequent additions of saline earth, it is saturated, and the brine so formed is then evaporated in earthen pots over a fire supplied from the woods of the jungles. Salt thus formed is bought from the natives for about 11d. the maund of 80lbs; but then it is a government monopoly, and they sell it again for 3s. a maund wholesale, and this is trebled before it gets to the consumer. A very curious and extensive work upon astronomy has just been published in Persian, by Rajah Ruttingsing a Hindoo Prince, residing at Lucknow. The printing, engravings of the various instruments, maps of the constellations, &c., are all done by native artists; and though roughly done they do credit to their artistical powers.

[*Extract of a Letter, dated Calcutta, July* 7, 1841.

ANTIDOTE FOR POISON.

The practice of forcing down large doses of powerful and irritating emetics, which in themselves, are almost sufficient to destroy life, cannot be too strongly reprehended. When emetics are necessary, as they sometimes are, especially in those cases of poisoning by substances which produce great torpor of the system, such as opium and all the narcotics, the safety of the patient requires that the dormant energies of the stomach be aroused. In these cases nothing is better to be given than ground black mustard, a large

tea-spoonfull of which may be mixed with water and swallowed at once. It operates very promptly, is perfectly safe, and nothing can be more effectual.

As a general rule the effects of poisons are better counteracted by articles, which being taken into the stomach immediately after the poison is swallowed enter into combination with the poison, and form with it a new substance, either harmless in itself, or incapable of being acted on by the fluids of the stomach.

For Oil of Vitriol, the best antidote is large doses of Magnesia and water, or what is still better, equal parts of soft soap and water.

For Aqua Fortis the same remedy as the last.

For Oxalic Acid, (this resembles Epsom Salts, and is often used for bed-bug poison.) Chalk and water renders it perfectly inert, forming an insoluble salt of lime. Magnesia is also a good antidote.

For Tartar Emetic in poisonous doses, Peruvian bark and water render it harmless. If they cannot be procured, use a strong decoction of tea.

For Saltpetre, which is also sometimes mistaken for salts, a prompt emetic of mustard and water; afterwards mucilages and small doses of laudanum.

For Opium and Laudanum in over doses, an emetic of mustard, constant motion in a wagon or otherwise, and the stomach pump when it can be obtained;

For Lunar Caustic, (the principal ingredient in indelible ink,) common salt forms an insoluble substance, which is harmless.

For Corrosive Sublimate. (This is the most common bed-bug poison, but it has probably destroyed as many persons as bed-bugs.) The whites of eggs mixed with water is the best and most effectual remedy. This should be given until free vomiting takes place. (Albumen renders this poison harmless; the whites of eggs are mostly albumen.)

For any of the Salts of Copper, the same remedy as the last.

For Arsenic. Three or four cases are reported as having been cured by doses of Magnesia. But the only antidote is the freshly prepared hydrated peroxide of iron. This is not always at hand, and cannot well be prepared except by a physician or apothecary.

GARDENER'S CALENDAR FOR FEBRUARY.

VEGETABLE GARDEN.

Sow peas, spinach, lettuce, cabbage, radish, corn, beets, carrots, salsafy, parsnips, turnips, thyme, sage, and other herbs. Plant Irish potatoes. Transplant cabbages and lettuces.

Remarks.—The same varieties of peas may be sown in this month, as were directed for the last. The principal crop of beets and carrots should now be sown. The common varieties of spinach should be sown in small quantities once in ten days, as it soon runs to seed.—*Miller's Planters' and Merchants' Almanac for* 1842.

Agricultural and Horticultural
REPOSITORY.

NO. 81 EAST-BAY, CHARLESTON, (SO. CA.)

FRESH AND GENUINE

GARDEN AND FIELD SEEDS.

THE SUBSCRIBER *has received his Full supply of GARDEN and FIELD SEEDS, consisting of all the varieties enumerated below, and several others which are new. Among them the highly prized WHITE BELGIAN CARROT, which unites the flavor of the Carrot and Parsnip, (for an account of which see current vol. So. Agr., p.* 411.) *Also, WINTER RYE, said to be equal for pasturage to the Carolina Rye; and SEED BARLEY.*

Twenty-five varieties of PEAS, among which are Cedo Nulli, Extra Early Dwarf, Early Warwick, Knight's Marrowfat, Blue Scymetar, Dwarf Sugar of Holland, Spanish Marrow; and all of the old varieties.

BEANS—nineteen varieties, among which are Dutch Dwarf, Davenport, China, Royal Dwarf, Horticultural, &c. &c.

BEETS—eight varieties, consisting of Early Turnip (red and yellow,) Long Blood, Yellow Castelnanderry, Red do., Silesia or Sugar, &c. &c.

CABBAGES—twenty-nine varieties, among which are Early Paris Superfine, Nonpareil, Hope, Vanack, Early York, Ox heart (large and small,) Battersea, St. Dennis, Early Dutch, Large do., Large Pancallier Savoy of Tours, Monstrous French Savoy, &c. &c.

BROCOLI—three varieties.

CAULIFLOWERS—six varieties, viz.: Tender or Spring, Half-hardy for autumn, Hardy of Paris, Dutch Hardy, Early and Late.

CARROTS—nine varieties. PARSNIPS—two varieties. CELERY—seven varieties. CRESS—three varieties. LETTUCE—nine varieties. CUCUMBER—four varieties. SQUASHES—seven varieties. MELONS *Musk*—nineteen superior varietles *from France*, embracing the Honfleur, Canteleups, Sugar, Persian, Winter, and many others in high estimation. Also, six varieties of American. WATER-MELONS—three varieties. KOHL RABBI—four varieties.

Together with many new and superior varieties of VEGETABLES not enumerated above, for which we refer to our printed catalogue.

ALSO,

FLOWER SEEDS, DAHLIA ROOTS, (some splendid varieties,) BULBOUS ROOTS, ROSES, GERANIUMS, GREEN-HOUSE PLANTS, FRUIT TREES,

IMPLEMENTS.

His STOCK OF IMPLEMENTS has been considerably increased, and embraces a larger variety than has ever been offered in this market. His PLOUGHS are from the most celebrated makers of New-England, and have taken numerous premiums; in addition to which, he has all of the MORE COMMON KINDS, and can accommodate his customers with Ploughs from $3 to $12, according to size and quality. He has also a LARGE ASSORTMENT OF STRAW-CUTTERS and CORN-SHELLERS, with EVERY OTHER IMPLEMENT REQUIRED on the FARM or PLANTATION.

Printed Catalogues will be furnished gratis on application *(post paid,)* and all Orders promptly executed. SEEDS and IMPLEMENTS carefully packed and sent by Steam-boat or Rail-road, to any part of this State, North-Carolina or Georgia.

November 4th, 1841. J. D. LEGARE.

CHEMICAL ANALYSIS OF SOILS,

MARLS, LIMESTONES, MINERAL WATERS, AND ORES GENERALLY.

PROF. SHEPARD of the South Carolina Medical College, begs leave to inform the public that he has fitted up a department in his Laboratory expressly for the performance of the above mentioned undertaking: and that all commissions of this nature, with which he may be favored, will receive his prompt, personal attention.

Address Prof. C. U. SHEPARD, Medical College, Charleston.

☞ The following payments have been made since our last: St. Helena Agricultural Society, Dr. J. W. Barker, Nathaniel Heyward, Charles Heyward, John H. Glover.

ON OLD ACCOUNT.—R. B. Beadon, Joel Crawford, William S. Thompson, C. R. Thompson, Charles Macbeth, John M. Stocker, A. Barnes, Dr. T. Y. Simmons.

NOTICE.

The Subscriber finding it inconvenient to attend to any other than the Editorial duties, requests that all letters on business be directed to the Publisher of this Journal, Mr. A. E. Miller, who will also attend to all the business transactions relating to the Southern Cabinet or Southern Agriculturist.

Dec. 3*d*, 1841. J. D. LEGARE.

BERKSHIRE PIGS.

THE SUBSCRIBER still continues to improve his superior breed of BERKSHIRE SWINE, by crossing with the best imported stock in the country. He has now on hand several very fine litters, and can supply those who wish to purchase, at $20 cash per pair, two months old, delivered on board of any vessel in New York, free of charge. Many of his stock have been sent to several distinguished agriculturists in South Carolina, and have given universal satisfaction.

WM. B. PARSONS.

Flushing, (Long Island,) Dec. 18, 1841. 3

BOOK-BINDING.

BINDING OF THE AGRICULTURIST AND OTHER BOOKS will be done neatly, and cheap, if sent to the office of the Publisher. Missing numbers furnished.

WILLIAM ESTILL, Binder.